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CHEMISTRY

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USSR REPORT

CHEMISTRY

CONTENTS

ADSORPTION

Relationship Between Structure of Chlorinated Biphenyls and  
Their Retention on Graphitized Thermal Carbon Black  
(A. K. Buryak, A. N. Fedotov, et al.; VESTNIK  
MOSKOVSKOGO UNIVERSITETA: SERIYA 2. KHIMIYA,  
No 6, Nov-Dec 85)..... 1

Photochemical Modification of Matrix for Enzyme Immobilization  
in Light Recording Systems  
(M. A. Manenkova, N. F. Kazanskaya, et al.; VESTNIK  
MOSKOVSKOGO UNIVERSITETA: SERIYA 2. KHIMIYA, No 6,  
Nov-Dec 85)..... 2

ALKALOIDS

Liquid Chromatography of Alkaloids. Part 6. Stabilization of  
Spectrophotometric Registration of Ionizing Compounds in  
Liquid Chromatography  
(P. P. Gladyshev, L. N. Bykova, et al.; IZVESTIYA  
AKADEMII NAUK KAZAKHSKOY SSR: SERIYA KHIMICHESKAYA,  
No 6 (234), Nov-Dec 85)..... 3

ANALYTICAL CHEMISTRY

Two-Laser Thermolens Determination of Phosphorus in Silicon  
(V. I. Grishko, V. P. Grishko, et al.; ZHURNAL  
ANALITICHESKOY KHIMII, No 12, Dec 85)..... 4

Gas-Liquid Chromatographic Analysis of Amino Acids on  
Micropacked Columns  
(A. I. Krylov, V. L. Borodina, et al.; ZHURNAL  
ANALITICHESKOY KHIMII, No 12, Dec 85)..... 4

Computerized Qualitative Analysis of Complex Polyarene Mixtures Based on Quasilinear Fluorescence Spectra: "Spektr" Information Retrieval System (V. I. Vershinin, S. V. Dozmorov, et al.; ZHURNAL ANALITICHESKOY KHIMII, No 12, Dec 85).....	5
Radioindicator Method for Butifos Determination (G. A. Brodskaya, O. U. Gapurova, et al.; UZBEKSKIY KHIMICHESKIY ZHURNAL, No 5, Sep-Oct 85).....	6
Use of Fine Ion Exchanger Dispersions in Flotation Concentration of Trace Elements (V. K. Ososkov, A. M. Plintus, et al.; UKRAINSKIY KHIMICHESKIY ZHURNAL, No 12, Dec 85).....	6
<b>BIOCHEMISTRY</b>	
Synthesis of Nucleoamino Acid Analogs of Natural Nucleopeptides (O. N. Ryabtseva, Yu. A. Semiletov, et al.; ZHURNAL OBSHCHEY KHIMII, No 11, Nov 85).....	8
Synthesis of Antireproductive Peptide (Yu. P. Shvachkin, Yu. N. Tikhonov; ZHURNAL OBSHCHEY KHIMII, No 11, Nov 85).....	8
<b>CATALYSIS</b>	
Conversion Pathways of Methanol to Hydrocarbons Over High Silica Content Zeolites (T. V. Vasina, Ye. G. Khelkovskaya-Sergeyeva, et al.; IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA, No 11, Nov 85).....	10
Synthesis of Polymeric Phosphine-Carborane Complexes Rh(I) and Their Catalytic Properties in Hydrogenation of Olefins and Dienes (V. N. Kalinin, O. A. Melnik, et al.; IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA, No 11, Nov 85).....	11
All-Union Seminar on Oxidative Heterogenous Catalysis (M. Shimanskaya, L. Leytis; IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR: SERIYA KHIMICHESKAYA, No 5, Sep-Oct 85). 11	11
Reactor for Carrying Out Granulated Catalyst Processes (I. D. Lucheyko, Ye. T. Gorodetskiy; IZVESTIYA VYSSHikh UCHEBNYkh ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHOLOGIYA, No 11, Nov 85).....	12

Hydration of Acrylonitrile in Presence of Copper-Vanadium Catalysts (N. I. Berezovskaya, I. M. Yavna, et al.; KHIMICHESKAYA TEKHNOLOGIYA, No 6, Nov-Dec 85).....	13
Problem of Restoring Blocks of Ammonia Synthesis Catalyst (V. Yu. Zozulya, V. N. Gelman, et al.; ZHURNAL PRIKLADNOY KHIMII, No 11, Nov 85).....	13
Effects of Molybdenum and Tungsten Oxides on Thermal Stability of Iron-Cobalt Catalysts for Ammonia Synthesis (V. S. Komarov, A. T. Rozin, et al.; VESTSI AKADEMII NAVUK BSSR: SERIYA KHIMICHNYKH NAVUK, No 6, Nov-Dec 85). .	14
Pyrolysis of Cellulose Hydrate Impregnated With H <sub>2</sub> PtCl <sub>6</sub> and Formation of Platinum-Carbon Fibers (I. N. Yermolenko, A. M. Safonova; VESTSI AKADEMII NAVUK BSSR: SERIYA KHIMICHNYKH NAVUK, No 6, Nov-Dec 85). .	15

#### CHEMICAL INDUSTRY

Ministry of Chemical Industry Defended (L. Osipenko; SOTSIALISTICHESKAYA INDUSTRIYA, 20 Dec 85). .	16
Certification of Work Sites--Reserves for Increased Production Effectiveness (V. R. Vyatsira; KAUCHUK I REZINA, No 12, Dec 85).....	18
Certification and Rationalization of Working Sites at Chemical Enterprises (V. F. Litvitskiy; KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE, No 12, Dec 85).....	18
Contributions of Chemical Machine Engineers to Agroindustrial Complexes (Yu. N. Levitskiy; KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE, No 12, Dec 85).....	19
Methods of Noise Tolerant Testing on Automated Chemical Technology Control Systems (S. V. Altshuler; KHIMICHESKAYA TEKHNOLOGIYA, No 6, Nov-Dec 85).....	20
Chemicalization of National Economy (EKONOMICHESKAYA GAZETA, No 52, Dec 85).....	20

#### COMBUSTION

Importance of Contact Melting in Nongaseous Combustion (Yu. M. Maksimov, A. G. Merzhanov, et al.; DOKLADY AKADEMII NAUK SSSR, No 4, Feb 86).....	22
---	----

## ELECTROCHEMISTRY

New Electrode Technology  
(I. Novodvorskii; IZVESTIYA, 30 Nov 85)..... 23

Static Uniaxial Compression and Energy of Activation of  
Conductivity of Phthalocyanine-Bivalent Metal Complexes  
(Yu. A. Berlin, N. G. Danielyan, et al.; DOKLADY  
AKADEMII NAUK SSSR, No 2, Jan 86)..... 24

Influence of Stimulators of Ceramic Powder Coprecipitation on  
Electroprecipitation of Nickel  
(V. V. Skrobotskaya, D. K. Ramanauskene; TRUDY AKADEMII  
NAUK LITOVSKOY SSR: SERIYA B, No 5, Sep-Oct 85)..... 25

Study of Nitrate-Selective Solid Contact Electrodes With  
Internal Oxidation-Reduction System  
(K. Kh.-Y. Leys, D. V. Sayenko, et al.; VESTNIK  
LENINGRADSKOGO UNIVERSITETA: FIZIKA, KHIMIYA, No 4,  
Nov 85)..... 25

Photostimulated Electrolysis of Water Over Heterogenous Bilayers  
of Titanium, Bismuth and Tungsten Oxides  
(D. V. Sviridov, S. K. Poznyak, et al.; VESTSI AKADEMII  
NAVUK BSSR: SERIYA KHIMICHNYKH NAVUK, No 6, Nov-Dec 85). 26

Electrochemical Cell for High-Temperature Electrolysis  
(G. I. Novikov, I. E. Chirkun, et al.; VESTSI AKADEMII  
NAVUK BSSR: SERIYA KHIMICHNYKH NAVUK, No 6, Nov-Dec 85). 27

Electroconductivity of Zeolite A in Sodium Form  
(G. R. Karagedov; IZVESTIYA SIBIRSKOGO OTDELENIYA  
AKADEMII NAUK SSSR: SERIYA KHIMICHESKIYE NAUKI, No 6,  
Nov-Dec 85)..... 27

Cathode Delamination of Polymer Coatings  
(G. S. Shapoval, V. A. Vagriy, et al.; ZHURNAL  
PRIKLADNOY KHIMII, No 11, Nov 85)..... 28

Germanium Ion Selective Field-Effect Transistors  
(Yu. G. Vlasov, V. P. Letavin, et al.; ZHURNAL  
PRIKLADNOY KHIMII, No 11, Nov 85)..... 29

## FERTILIZERS

Physical Properties of Ammophosphate and Quality of Dry  
Concentrated Fertilizer Mixtures Based on It  
(N. L. Malonosov, V. A. Kagramanova, et al.;  
AGROKHIMIYA, No 11, Nov 85)..... 30

Carbamide Conditioning in Instruments With Pseudoliquefied Layer	
(L. N. Ovchinnikov, V. A. Kruglov, et al.; IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNOLOGIYA, No 11, Nov 85).....	31
Study of Synthetic Processes for Concentrated Phosphorus-Potassium Fertilizers Utilizing Low Temperature Plasma (Part 2)	
(V. P. Voychak, N. Ya. Dyankova, et al.; IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA KHIMICHESKAYA, No 6 (234), Nov-Dec 85).....	31
Conditioning of Nitroammonofoska Ammonium Fertilizer With Calcium Nitrate	
(A. L. Goldinov, O. B. Abramov, et al.; ZHURNAL PRIKLADNOY KHIMII, No 10, Oct 85).....	32
Chemical and Technological Aspects of Complex Fertilizers Supplemented With Trace Elements	
(M. N. Nabiyev, S. Tukhtayev; UZBEKSKIY KHIMICHESKIY ZHURNAL, No 5, Sep-Oct 85).....	33
Liquid Ammoniacal-Sulfopolyphosphate Fertilizers	
(A. U. Erkayev, Sh. S. Namazov; UZBEKSKIY KHIMICHESKIY ZHURNAL, No 5, Sep-Oct 85).....	33
Production of Complex Liquid Fertilizers From Poor Karatau Phosphorite	
(L. V. Konyakhina, T. V. Tokmakova, et al.; KHIMIYA V SELSKOM KHOZYAYSTVE, No 10, Oct 85).....	34
Effects of Complex Polymeric Fertilizer on Corn Productivity on Dark-Chestnut Solonetz Soil	
(N. A. Yukin; KHIMIYA V SELSKOM KHOZYAYSTVE, No 10, Oct 85).....	34
Threshold of Production Victory for USSR Ministry of Fertilizers	
(L. D. Ruban; KHIMIYA V SELSKOM KHOZYAYSTVE, No 12, Dec 85).....	35
FOOD TECHNOLOGY	
Improving Quality of Food in USSR	
(A. N. Bogatyrev; KHIMIYA I ZHIZN, No 12, Dec 85).....	36
Introduction of Novel Food Products in USSR	
(KHIMIYA I ZHIZN, No 12, Dec 85).....	37

## INORGANIC COMPOUNDS

Chemical Composition and Mechanism of Formation of Ceramet Films in Chromium Disilicide-Glass System  
(M. M. Kosyakina, A. V. Yeliseyev, et al.; ZHURNAL PRIKLADNOY KHIMII, No 10, Oct 85)..... 38

Corrosion of Silicon Nitride-Based Ceramics in Stream of Fuel Combustion Products  
(Yu. G. Gogotsi, V. V. Shvayko, et al.; DOKLADY AKADEMII NAUK SSSR, No 4, Feb 85)..... 39

Energy and Resource Conserving Technology for Producing Silicate Materials Using Alkaline Additives and Prospects for Its Use (Review)  
(I. G. Kovzun, I. T. Protsenko, et al.; KHIMICHESKAYA TEKHNOLOGIYA, No 6, Nov-Dec 85)..... 39

## ION EXCHANGE PHENOMENA

Ion Exchangers From Waste Products  
(M. Marfin; KHIMIYA I ZHIZN, No 12, Dec 85)..... 41

## NITROGEN COMPOUNDS

Properties of Polycondensated Polyelectrolytes Synthesized From Quaternary Derivatives of Nicotinamide and Novocaine  
(A. Kh. Khalmatov, Z. Sh. Asadullina, et al.; UZBEKSKIY KHIMICHESKIY ZHURNAL, No 5, Sep-Oct 85)..... 42

## ORGANOPHOSPHORUS COMPOUNDS

Kinetics and Mechanism of Catalytic Phosgenation of Phenols.  
Part 1. Phosgenation of 1-Naphthol in Presence of Tetramethylurea  
(M. S. Grabarnik, A. L. Chimishkayn, et al.; ZHURNAL ORGANICHESKOY KHIMII, No 11, Nov 85)..... 43

Reaction of Trivalent Phosphorus Acid Derivatives With 3-Azido- $\beta$ -Lactams and Characteristics of Resultant Phosphimides  
(M. N. Dimukhametov, I. A. Nuretdinov; ZHURNAL OBUHCHEY KHIMII, No 11, Nov 85)..... 44

## PESTICIDES

Prospects for Agricultural Mechanization  
(I. N. Veletskiy; ZASHCHITA RASTENIY, No 1, Jan 86)..... 45

Study of Knock-Down Effect of Pyrethroids for Useful Insects  
(O. Yu. Yeremina, S. A. Roslavlseva, et al.; AGROKHIMIYA, No 11, Nov 85)..... 46

Safety Technology for Storage, Transportation and Use of Agricultural Pesticides (ZASHCHITA RASTENIY, No 1, Jan 86).....	46
Gibbersib Plant Growth Regulator Approved by State Commission on Chemical Agents of Plant Pest Control (V. Polishchuk; KHIMIYA I ZHIZN, No 11, Nov 85).....	47
<b>PETROLEUM PROCESSING TECHNOLOGY</b>	
Effect of Soviet Cancellation of Petrochemical Plant Projects on East and West Europe and Malaysia (Patrick Cockburn; BUSINESS NEWS, 1 Feb 85).....	48
Effects of Zeolite Content and Matrix on Characteristics of Cracking Catalysts (V. F. Klaptsov, B. K. Nefedov, et al.; KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL, No 12, Dec 85).....	50
Antiknock Effectiveness of Oxygen Compounds in Different Fuels (S. M. Livshits, I. M. Nikitin, et al.; KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL, No 12, Dec 85).....	51
Standardized Use of Productive Capacities in Refinery Industry (Ye. L. Vashchilina, L. L. Savranskaya; KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL, No 12, Dec 85).....	51
Effects of Temperature on Energy Dissipation by Bitumen (V. I. Khrapko, A. N. Bodan, et al.; KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL, No 12, Dec 85).....	52
Seminar on Motor Fuel and Oil Chemistry (K. I.. Bessmertnyy; KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL, No 11, Nov 85).....	52
Siberian Oilfield Production Problems (Ya. Ali-Zade, G. Bazhutin, et al.; SOTSIALISTICHESKAYA INDUSTRIYA, 28 Jan 86).....	53
Delayed Expansion of Petroleum Output (Ya. Ali-Zade, G. Bazhutin, et al.; SOTSIALISTICHESKAYA INDUSTRIYA, 28 Jan 86).....	54
<b>PHARMACOLOGY AND TOXICOLOGY</b>	
Studies of Heterocycles. Part 57: Hydration of 5-Arylidene-2-Selenobarbituric Acids (A. V. Moskvin, G. V. Kulpina, et al.; ZHURNAL ORGANICHESKOY KHIMII, No 11, Nov 85).....	56

POLYMERS AND POLYMERIZATION

Achievements of Institute of Chemistry and Physics of Polymers, Uzbek SSR Academy of Sciences in 11th Five Year Plan and Research Foreseen for 12th Five Year Plan (S. Sh. Rashidova; UZBEKSKIY KHIMICHESKIY ZHURNAL, No 5, Sep-Oct 85).....	57
Seventh All Union Conference on "Aging and Stabilization of Polymers" (S. M. Kavun; KAUCHUK I REZINA, No 12, Dec 85).....	58
Metal-Polymer Compositions Based on Polytetrafluoroethylene and Copper (I. N. Gribanova, V. L. Bogatyrev; IZVESTIYA SIBIRSKOGO OTDELENIYA AKADEMII NAUK SSSR: SERIYA KHIMCHESKIYE NAUKI, No 6, Nov-Dec 85).....	58
Influence of Formation Conditions on Properties of Profiled Filaments Obtained by an Aerodynamic Method (V. A. Svistunov, A. V. Genis, et al.; KHIMICHESKIYE VOLOKNA, No 6, Nov-Dec 85).....	59
Study of Process of Oxidation of Actual Surface of Aluminum With Organic Coating (L. A. Akashev, V. I. Kononenko, et al.; ZHURNAL FIZICHESKOY KHIMII, No 11, Nov 85).....	60
Measurement System for Study of Laser Pyrolysis of Polymer Materials (S. G. Bychkov, A. V. Desyatkov, et al.; ZHURNAL FIZICHESKOY KHIMII, No 11, Nov 85).....	60
Thermal Destruction of Polyimide Films by Laser Action and Heat Treatment (B. A. Vinogradov, V. B. Kopylov, et al.; ZHURNAL PRIKLADNOY KHIMII, No 10, Oct 85).....	61
Effective Use of Exhaust Gases (KHIMIYA I ZHIZN, No 12, Dec 85).....	61
Heat Effects on Metal Strength in Coating With Poly-[3,3-Bis- (Chloromethyl)Oxetane] (V. A. Belyy, L. S. Pinchuk, et al.; DOKLADY AKADEMII NAUK SSSR, No 4, Feb 86).....	62
$[CH(LiAlH_4)]_x$ : Organic Semiconductor (V. Kh. Ksipteridis; ARMYANSKIY KHIMICHESKIY ZHURNAL, No 12, Dec 85).....	62

## RADIATION CHEMISTRY

Enzymatic Synthesis of Radiolabeled Nucleotides From  
Radiolabeled Precursor Bases  
(M. D. Frank-Kamenetskaya, G. V. Knizhnikova, et al.;  
RADIOKHIMIYA, No 5, Sep-Oct 85)..... 63

Isotope Composition of Plutonium in Spent Fuel of VVER [Sic]  
Reactor: Alpha- and Gamma-Spectrometric Studies and Isotope  
Correlations  
(A. V. Stepanov, A. M. Fridkin, et al.; RADIOKHIMIYA,  
No 5, Sep-Oct 85)..... 64

Effects of Selective Characteristics of Emitters on Radiant  
Heating of Optical Glass  
(V. S. Doladugina, K. I. Krulin, et al.; FIZIKA  
I KHMITYA STEKLA, No 6, Nov-Dec 85)..... 64

BCl<sub>3</sub> Sensitization of CO<sub>2</sub> Laser-Induced Reaction of Hydrogen  
With Chlorine  
(A. P. Nikonorov, Ye. N. Moskvitina; VESTNIK  
MOSKOVSKOGO UNIVERSITETA: SERIYA 2. KHMITYA,  
NO 6, Nov-Dec 85)..... 65

Formation of Oscillation-Stimulated CO<sub>2</sub> and HCOOH Molecules in  
Reaction of Fluorine With Formic Acid  
(V. G. Fedotov; KHIMICHESKAYA FIZIKA, No 12, Dec 85).... 65

## RUBBER AND ELASTOMERS

Effects of Chemical Characteristics of Solid Phase Surface  
on Structure-Formation Kinetics of Reinforced Butyl Rubber  
(N. N. Kruglitskiy, A. D. Kuznetsov; UKRAINSKIY  
KHMICHESKIY ZHURNAL, No 12, Dec 85)..... 67

## WATER TREATMENT

Finnish Purification Plants for USSR  
(DOMESTIC SERVICE, 4 Feb 86)..... 68

## WOOD CHEMISTRY

Developing Wasteless Technology in Wood Industry  
(SELSKAYA ZHIZN (TASS), 3 Dec 85)..... 69

Cellulose Will Become Stronger  
(A. Kolotilin; LESNAYA PROMYSHLENNOST, 5 Dec 85).... 70

Socialist Commitment of Svetogorskiy Pulp-and-Paper Mill Collective to 12th Five-Year Plan (LESNAYA PROMYSHLENNOST, 28 Dec 85).....	71
Ultrafiltration Separation From Sulfite Alkali of Lignosulfonates Removed From Water by Coagulation (Yu. M. Medvedev, M. I. Medvedev, et al.; ZHURNAL PRIKLADNOY KHIMII, No 10, Oct 85).....	73
Differential Scanning Calorimetry in Assessment of Water- Cellulose Interaction (N. N. Kruglitskiy, T. N. Polishchuk, et al.; UKRAINSKIY KHMICHESKIY ZHURNAL, No 12, Dec 85).....	74
Change in Hydrolyzability of Cellulose as Result of Plastic Flow Under High Pressure (Ya. M. Beluza, V. A. Zhorin, et al.; DOKLADY AKADEMII NAUK SSSR, No 6, Dec 85).....	74
<b>MISCELLANEOUS</b>	
Obstacles to Introducing Automated Control (A. Shadrina; LESNAYA PROMYSHLENNOST, 24 Dec 85).....	76
Hydrogen-Powered Motor Vehicle (A. Fin; ZNANIYE-SILA, No 12, Dec 85).....	80

ADSORPTION

UDC 543.544.539

RELATIONSHIP BETWEEN STRUCTURE OF CHLORINATED BIPHENYLS AND THEIR RETENTION ON GRAPHITIZED THERMAL CARBON BLACK

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: SERIYA 2. KHIMIYA in Russian  
Vol 26, No 6, Nov-Dec 85 (manuscript received 20 Sep 84) pp 568-571

[Article by A. K. Buryak, A. N. Fedotov and A. V. Kiselev (deceased),  
Chair of Organic Chemistry, Moscow State University; Institute of Physical  
Chemistry, USSR Academy of Sciences]

[Abstract] A study was conducted on the heats of adsorption and separation of mixtures of chlorinated biphenyls on columns of graphitized thermal carbon black. Analysis of the isomers relied on atomic absorption spectroscopy, showing that retention is reduced by a chlorine atom in the ortho position relative to the bond linking the two benzene rings. The retention of 2-chlorobiphenyl was weaker than that of 4-chlorobiphenyl. Differences in the retention of 2,4,6- and 2,6,2'-trichlorobiphenyl demonstrated lower retention of 2,4,6- and 2,6,2'-trichlorobiphenyl demonstrated lower retention of the isomer with the three chlorine atoms in the ortho position, due to the fact that the presence of substituents in the ortho position increases the angle of internal rotation of the molecule, rendering it less planar. The heats of adsorption for 2- and 4-chlorobiphenyl were, respectively, 66 and 73 kJ/mole, with 3-chlorobiphenyl in an intermediate position. These differences in retention were ascribed to the fact that the chlorine atom in the meta position, while not increasing the angle of internal rotation, does prevent optimal orientation of the biphenyl on the carbon black surface for retention. Similar 'meta' effects were also noted for 3,3-, 3,4'- and 4,4'-dichlorobiphenyls. In summary, adsorption on carbon black was determined to be an efficient method for resolving complex mixtures of chlorinated biphenyls, and for assay of ortho-substituted isomers. Figures 3; references 8: 1 Russian, 7 Western.

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PHOTOCHEMICAL MODIFICATION OF MATRIX FOR ENZYME IMMOBILIZATION IN LIGHT RECORDING SYSTEMS

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: SERIYA 2. KHIMIYA in Russian Vol 26, No 6, Nov-Dec 85 (manuscript received 17 Jul 84) pp 592-597

[Article by M. A. Manenkova, N. F. Kazanskaya and I. V. Berezin, Chair of Chemical Enzymology, Moscow State University]

[Abstract] An analysis was conducted on the factors determining the efficiency of immobilized enzyme systems relying on light registration, using *E. coli* alkaline phosphatase immobilization on FN-4 chromatographic paper. The acetal derivative of p-azidobenzaldehyde was used as the light-sensitive agent for impregnation of the paper, followed by exposure to 313 nm light for photolysis of the azide. Following hydrolysis of the acetal, the aldehyde groups were used for coupling of the enzyme via Schiff base formation. Enzyme activity was measured by a modification of standard histochemical methods for detection of alkaline phosphatase, i.e., the use of alpha-naphthyl phosphate substrate and combination of the released alpha-naphthol with a diazonium salt to form a dark, water-insoluble precipitate at the site of the reaction. The basic reason for inadequate light sensitivity was shown to be due to incomplete utilization of all the aldehyde groups for enzyme immobilization. Maximum reaction with the aldehyde groups were prevented by the large size of the enzyme (86000 daltons) and the porosity of the supporting material. Longer immobilization times could not be utilized because of increased nonspecific adsorption of alkaline phosphatase. Figures 4; references 11: 3 Russian, 8 Western.

12172/9835  
CSO: 1841/353

ALKALOIDS

UDC 543.544.2:547.94

LIQUID CHROMATOGRAPHY OF ALKALOIDS. PART 6. STABILIZATION OF SPECTRO-PHOTOMETRIC REGISTRATION OF IONIZING COMPOUNDS IN LIQUID CHROMATOGRAPHY

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA KHIMICHESKAYA  
in Russian No 6 (234), Nov-Dec 85 (manuscript received 7 Jun 83) pp 73-78

[Article by P. P. Gladyshev, L. N. Bykova and N. P. Kamenskiy, Institute of Chemical Sciences, KaSSR Academy of Sciences, Alma-Ata]

[Abstract] Various factors were analyzed which appeared to influence the accuracy and reproducibility of spectrophotometric registration of compounds undergoing ionization during liquid chromatography. On the basis of theoretical considerations, it was concluded that the principal error introduced into chromatographic analysis could be due to the limitations in controlling pH of the medium. To correct this problem, an apparatus was constructed designed to program and maintain a steady pH in solutions and in effluents. This unit was tested with satisfactory results on a chromatography run of some alkaloids. Figures 3; references 12: 11 Russian (3 by Western authors), 1 Western.

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ANALYTICAL CHEMISTRY

UDC 543.420.62:535.8

TWO-LASER THERMOLENS DETERMINATION OF PHOSPHORUS IN SILICON

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 40, No 12, Dec 85  
(manuscript received 22 Oct 84) pp 2155-2160

[Article by V. I. Grishko, V. P. Grishko, M. M. Goldshteyn and  
I. G. Yudelevich, Institute of Inorganic Chemistry, Siberian Department,  
USSR Academy of Sciences, Novosibirsk]

[Abstract] Two-laser thermolens technology was employed in the determination of phosphorus in semiconductor silicon and phosphate glass, using a helium-cadmium laser with a wavelength of 441.6 nm and output power of 100 mW. A linear standard curve was obtained in the concentration range of 0.6-400 ng/ml phosphorus in a final organic mixture (1:2:2) of isobutanol, hexane, and acetone. The minimal detectable phosphorus concentration was ascertained at 0.6 ng/ml, with a relative standard deviation of 0.074 ( $n = 5$ ) in the concentration range of  $1.2 \times 10^{-7}$  to  $5.3 \times 10^{-4}$ . The mean standard deviation in the measurements of an analytical signal did not exceed 0.03 ( $n = 30$ ), with the results obtained by the two-laser thermolens technique showing excellent agreement with the results obtained by the neutron-activation method. Figures 3; references 13: 2 Russian, 11 Western.

12172/9835  
CSO: 1841/376

UDC 543.54:547.466

GAS-LIQUID CHROMATOGRAPHIC ANALYSIS OF AMINO ACIDS ON MICROPACKED COLUMNS

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 40, No 12, Dec 85  
(manuscript received 25 May 83) pp 2235-2240

[Article by A. I. Krylov, V. L. Borodina and V. A. Rogozkin, Leningrad Scientific Research Institute of Physical Culture]

[Abstract] Trials were conducted on the separation and analysis of amino acids in the form of N-perfluoroacyl derivatives of n-propyl esters on

microcolumns (1.5 m x 1.2 mm) filled with 0.53% polyethylene glycoladipinate on various chromosorbs (WAW, WAW-DMCS, or WHP). With nitrogen as the carrier gas, optimal separation was obtained with the 80-100 mesh WAW chromosorb in the case of 17 biologically important amino acids. Graphic and tabular data are provided on separation patterns and retention times. However, the aspartic acid and methionine derivatives could not be resolved by this method. Flame ionization resulted in detection levels of  $(0.5-1.0) \times 10^{-11}$  mole for the derivatives in question. These observations indicate that microcolumns can be used successfully in separation and analysis of derivatized amino acids by gas-liquid chromatography, with the advantage that only 0.5-1  $\mu$ liter samples are required. Figures 3; references 19: 5 Russian, 14 Western.

12172/9835  
CSO: 1841/376

UDC 543.061:535.372:547.64

COMPUTERIZED QUALITATIVE ANALYSIS OF COMPLEX POLYARENE MIXTURES BASED ON QUASILINEAR FLUORESCENCE SPECTRA: "SPEKTR" INFORMATION RETRIEVAL SYSTEM

Moscow ZHURNAL ANALITICHESKOY KHMII in Russian Vol 40, No 12, Dec 85  
(manuscript received 14 Jun 84) pp 2249-2258

[Article by V. I. Vershinin, S. V. Dozmorov and A. B. Ovechkin, Omsk State University]

[Abstract] Theoretical foundations are presented on the design of an information retrieval system for the qualitative analysis of complex polyarene mixtures on the basis of their quasilinear fluorescence spectra. The system, designated "Spektr", was written in FORTRAN IV, with the program consisting of 191 operators and requiring 94 kbytes of memory. Depending on the complexity of a given spectrum, the processing time per spectrum ranges from 0.5 to 10 min on EC-1033 computer. A relatively narrow emission band in the 380-460 nm range was found to contain ca. 75% of the standard lines of the quasilinear luminescence of 80 polyarenes, with virtually all polyarenes also demonstrating phosphorescence in the 500-650 nm range. The key analytical signal indicating probable presence of a given polyarene was the coefficient of identification, reflecting the number of lines of a standard spectrum that coincided with the lines of the unknown sample in terms of the wavelength. Reliability of identification could be further improved by variations in the wavelength used for excitation. Tabular data on identification of several polyarenes are presented. Figures 3; references 14: 11 Russian, 3 Western.

12172/9835  
CSO: 1841/376

UDC 542.61

RADIOINDICATOR METHOD FOR BUTIFOS DETERMINATION

Tashkent UZBEKSKIY KHIMICHESKIY ZHURNAL in Russian No 5, Sep-Oct 85  
(manuscript received 25 Jan 85) pp 8-11

[Article by G. A. Brodskaya, O. U. Gapurova, Ye. S. Gureyev and  
R. Kh. Dzhiyanbayeva, Tashkent Order of the Red Banner of Labor State  
University imeni V. I. Lenin]

[Abstract] An extraction procedure is derived for the analytical determination of butifos, relying on complex formation between that pesticide and either Hg-203 or Ag-110. The metal:butifos ratio in the resultant complexes was 1:1. In conjunction with partition coefficients and radiometric measurements, the concentrations of butifos could be determined down to a concentration of 0.1  $\mu\text{g}/\text{ml}$ . Efficiency of butifos extraction with benzene or chloroform from an aqueous medium approached 95% on first extraction, with 98% extraction attained with a second extractive step. Figures 3; references 4 (Russian).

12172/9835  
CSO: 1841/327

UDC 543.064:622.765

USE OF FINE ION EXCHANGER DISPERSIONS IN FLOTATION CONCENTRATION OF TRACE ELEMENTS

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 51, No 12, Dec 85  
(manuscript received 28 Jun 84) pp 1298-1301

[Article by V. K. Ososkov, A. M. Plintus, M. E. Kornelli and A. N. Zakhariya,  
Odessa Technologic Institute of the Food Industry; Odessa University]

[Abstract] A method has been devised for the concentration of bismuth from  $\text{HNO}_3$  solutions adjusted to pH 1 with  $\text{HCl}$ , which relies on the adsorption of the bismuth ions to the chloride form of the ion exchangers EDE-10P or AV-17-8. The ion exchanges with particle diameters of less than 0.1 mm are harvested with 0.5% sodium dodecylsulfate, subjected to electrothermal atomization for 10 sec at  $2000^\circ\text{C}$ , and analyzed by atomic absorption spectrometry. Over a concentration range of  $10^{-9}$  to  $10^{-7}$  g the standard deviation was on the order of 0.05-0.11. Over a 20 min contact period the adsorption rate for bismuth on either ion exchanger was on the order of 97-99%, with recovery studies showing that zinc and copper did not interfere in this flotation process. These observations indicate that the

combination of flotation using fine dispersions of ion exchangers and atomic absorption spectrometry represents a convenient and relatively inexpensive technique for recovery and analysis of trace elements. Figures 2; references 13: 8 Russian, 5 Western.

12172/9835  
CSO: 1841/352

BIOCHEMISTRY

UDC 547.854+547.857

SYNTHESIS OF NUCLEOAMINO ACID ANALOGS OF NATURAL NUCLEOPEPTIDES

Leningrad ZHURNAL OBSHCHEY KHMII in Russian Vol 55, No 11, Nov 85  
(manuscript received 14 May 85) pp 2633-2634

[Article by O. N. Ryabtseva, Yu. A. Semiletov, G. A. Korshunova and  
Yu. P. Shvachkin, Moscow State University imeni M. V. Lomonosov]

[Abstract] The pentafluorophenol method for the synthesis of peptides was employed in the synthesis of analogs of two novel nucleopeptides isolated from the seeds of *Fagus silvatica*:  $\gamma$ -L-glutamyl-L- $\beta$ -(uracilyl-N<sup>1</sup>)- $\alpha$ -alanine and  $\gamma$ -L-glutamyl-L-phenylalanyl-L- $\beta$ -(uracilyl-N<sup>1</sup>)- $\alpha$ -alanine. Using this method [Kisfaludy, L., et al., J. Org. Chem., 35: 3563, 1970], the analogs of I and II were obtained in the form of nucleoamino acids. The L- $\beta$ -(uracilyl-N<sup>1</sup>)- $\alpha$ -alanine moiety was replaced by L- $\beta$ -(thyminyl-N<sup>1</sup>)- $\alpha$ -alanine or with L- $\beta$ -(adenilyl-N<sup>9</sup>)- $\alpha$ -alanine in the analogs. References 5: 2 Russian, 3 Western.

12172/9835  
CSO: 1841/345

UDC 547.964.4

SYNTHESIS OF ANTIREPRODUCTIVE PEPTIDE

Leningrad ZHURNAL OBSHCHEY KHMII in Russian Vol 55, No 11, Nov 85  
(manuscript received 24 Apr 85) p 2632

[Article by Yu. P. Shvachkin and Yu. N. Tikhonov, Institute of Experimental Endocrinology and Hormone Chemistry, USSR Academy of Medical Sciences, Moscow]

[Abstract] Chemical synthesis of the epiphyseal antireproductive peptide, H-Thr-Ser-Lys-NH<sub>2</sub>, has been achieved, starting with N<sup>E</sup>-benzyloxycarbonyl lysine amide, pentafluorophenyl N-tert-butyloxycarbonyl serine, and pentafluorophenyl N-benzyloxycarbonyl threonine. The intermediate products were

$N^{\alpha}$ -tert-butyloxycarbonylseryl- $N^{\epsilon}$ -benzyloxycarbonyl lysine amide,  $N^{\alpha}$ -benzyloxycarbonylthreonyl-seryl- $N^{\epsilon}$ -benzyloxycarbonyl lysine amide, and  $N^{\alpha}$ -benzyloxycarbonyllysine amide. The protective benzyloxycarbonyl groups were removed from the latter compound by catalytic hydrogenolysis over palladium black. The target tripeptide was obtained in the hydrochloride form in 95% yield. References 3: 1 Russian, 2 Western.

12172/9835  
CSO: 1841/345

CATALYSIS

UDC 541.128:547.261:549.67

CONVERSION PATHWAYS OF METHANOL TO HYDROCARBONS OVER HIGH SILICA CONTENT  
ZEOLITES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHMICHESKAYA in Russian No 11,  
Nov 85 (manuscript received 25 Jul 84) pp 2435-2442

[Article by T. V. Vasina, Ye. G. Khelkovskaya-Sergeyeva, B. K. Nefedov and  
O. V. Bragin, Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR  
Academy of Sciences, Moscow]

[Abstract] Conversion of methanol to hydrocarbons in presence of zeolites with high silica content (ZHS) is an actively investigated area. To determine the nature, and the patterns of various stages of this process, conversion of  $\text{CH}_3\text{OH}$  and intermediate products  $\text{CH}_3\text{OCH}_3$  and  $\text{C}_2\text{H}_4$  were studied under comparable conditions using domestic pentasil type ZHS. The results have shown that  $\text{CH}_3\text{OCH}_3$  and  $\text{C}_2\text{H}_4$  are the intermediate products of the conversion of methanol to liquid aliphatic and aromatic hydrocarbons. A bivalent particle  $[\text{:CH}_2]$  participates in the formation of the C-C bond. This is supported by the following facts: presence of considerable quantities of odd-numbered hydrocarbons even at low temperatures where cracking is minimal, low content of  $\text{CH}_4$ , formation of branched hydrocarbons and presence of polymethyl substituted benzenes. The three principal compounds studied appeared to undergo identical conversions in this system. Figures 4; references 19: 6 Russian, 13 Western.

7813/9835  
CSO: 1841/335

SYNTHESIS OF POLYMERIC PHOSPHINE-CARBORANE COMPLEXES Rh(I) AND THEIR  
CATALYTIC PROPERTIES IN HYDROGENATION OF OLEFINS AND DIENES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian  
No 11, Nov 85 (manuscript received 2 Jul 84) pp 2442-2447

[Article by V. N. Kalinin, O. A. Melnik, A. A. Sakharova, T. M. Frunze,  
L. I. Zakharkin, N. V. Borunova and V. Z. Sharf, Institute of Heteroorganic  
Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow;  
Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of  
Sciences, Moscow]

[Abstract] Methylmethacrylate copolymers with 1-isopropenyl-(3)-1,2-dicarbamdecaborate salts were synthesized which, after reaction with  $\text{Rh}(\text{PPh}_3)_3\text{Cl}$  were converted to polymeric phosphine-carborane complexes. Their catalytic properties in hydrogenation and isomerization of olefins and dienes were investigated. These catalysts were found to be highly active. Hydrogenation of dienes was not as rapid as that of olefins. The rates depended significantly on the solvent used. The unique aspect of this catalytic system is the fact that, even at the early synthetic stage, the labile hydrogen atom of dicarbamdecaborate anion shifts towards Rh forming a monohydride complex. Figures 3; references 6: 3 Russian (1 by Western authors), 3 Western.

7813/9835  
CSO: 1841/335

ALL-UNION SEMINAR ON OXIDATIVE HETEROGENOUS CATALYSIS

Riga IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR: SERIYA KHIMICHESKAYA  
in Russian No 5, Sep-Oct 85 pp 633-634

[Article by M. Shimanskaya and L. Leytis]

[Abstract] An All-Union Seminar on Oxidative Heterogenous Catalysis was held on April 15-16, 1985 at the Institute of Organic Synthesis (IOS), Latvian SSR Academy of Sciences. The Seminar was jointly organized, by the Scientific Council of the USSR Academy of Sciences and the Latvian SSR Section of the All-Union Chemical Society imeni D. I. Mendeleyev, to deal with developments in oxidative heterogenous catalysts and coordination of research efforts in the USSR on this topic. The Seminar was opened by G. Ya. Dubur, deputy director of IOS, who emphasized the practical importance of partial oxidation processes and research on oxidation of heterocyclics done at the IOS, and the importance of cooperation with other research establishments. M. V. Shimanskaya, IOS, spoke on "Catalytic Partial Oxidation in Organic Synthesis", with emphasis on the transformation of

heterocyclics by means of multicomponent catalytic systems. L. Ya. Leytis, IOS, discussed active catalysis systems from the viewpoint of the phase composition of the catalyst and the structure of the target molecule in a talk entitled "Oxide and Phosphate Catalysts in Partial Oxidation of Methylated Heterocyclics". Regardless of the initial chemical characteristics of vanadium-based catalysts, the active surface consists of a dynamic system of variable-valency vanadium ions. The Seminar ended with a call for greater coordination of research efforts among the various research establishments of the USSR, with the note that primary efforts at further development in the period 1986-1990 be addressed at improving selectivity of partial oxidation. Specifically, the target areas include development of catalysts for partial oxidation of saturated hydrocarbons and studies of the mechanisms involved. emphasis on oxidation of organic compounds containing heteroatoms, refinements in instrumental methods of physical analysis, improvements in selectivity by equilibrium shifts among intermediate products, and detailed studies on multiphase multicomponent catalysts *in situ*. Successful conclusion of the research program will bring closer the day of more complete practical applications of oxidative heterogenous catalysis in the chemical industry.

12172/9835  
CSO: 1841/358

UDC 66.023.097.323(088.8)

#### REACTOR FOR CARRYING OUT GRANULATED CATALYST PROCESSES

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHMICHESKAYA TEKHOLOGIYA in Russian Vol 28, No 11, Nov 85  
(manuscript received 26 Feb 84) pp 108-111

[Article by I. D. Lucheyko and Ye. T. Gorodetskiy, Department of General Chemistry, Ternopol State Medical Institute]

[Abstract] A flow reactor with a stirrer was constructed for use with heterogenic catalysis which would avoid granulation of the catalyst, lower its dispersion and thermal destruction while maintaining highly efficient mixing of the system liquid-solid. The reactor works on the following principle: rotation of a turbine mixer pushes the liquids by centrifugal forces of inertia through a solid granular layer of the catalyst followed by passage of the mixture through central openings of the turbine, leading to closed circuits of liquid phase in axial crosssections of the reactor. Experimentally, dealkylation effectively converted 2,6-di-tert-butyl-4-methylphenol (ionol) to 2-tert-butyl-4-methylphenol. Figures 1; references 7 (Russian).

7813/9835  
CSO: 1841/336

UDC: 547.398.1:66.061.5

HYDRATION OF ACRYLONITRILE IN PRESENCE OF COPPER-VANADIUM CATALYSTS

Kiev KHMICHESKAYA TEKHOLOGIYA in Russian No 6, Nov-Dec 85  
(manuscript received 26 May 85) pp 22-23

[Article by N. I. Berezovskaya, I. M. Yavna, I. O. Mikhaylyshin and  
T. M. Mokrivskiy, Lvov Polytechnic Institute]

[Abstract] The increasing demand for acrylamide has stimulated a search for better manufacturing technology, including the so-called catalytic method of hydration of acrylic acid nitrile using copper-based catalysts. These catalysts are quite sensitive to oxygen and rapidly lose activity in use. Copper-chromium catalysts are more resistant to deactivation but less selective. Copper-vanadium catalysts have been suggested as the best solution. The hydration of acrylic acid nitrile in the presence of copper-vanadium catalysts is studied as a function of composition and duration of operation of the catalysts. The influence of the quantity of vanadium salt on the rate of hydration was studied. It was found that the activity of the catalyst changed little over the course of 10 experiments, than began dropping rapidly. The catalyst is not suitable for hydration of nitriles in the finely dispersed state. Further studies will be directed toward improving the catalyst. Figures 2; references 7: 3 Russian, 4 Western.

6508/9835  
CSO: 1841/292

UDC: 661.53.097.3:543.225

PROBLEM OF RESTORING BLOCKS OF AMMONIA SYNTHESIS CATALYST

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 58, No 11, Nov 85  
(manuscript received 27 Aug 84) pp 2430-2434

[Article by V. Yu. Zozulya, V. N. Gelman, V. N. Yefremov and Ye. Z. Golosman,  
State Scientific Research and Planning Institute of the Nitrogen Industry  
and Products of Organic Synthesis]

[Abstract] A study is presented of the process of reduction of blocks of catalysts prepared using various types of binding substances, and the influence of caking conditions of the specimens on the process is determined. The rate of reduction of catalyst blocks was studied by a thermogravimetric method. The temperature was increased to 800°C in a reactor at 3°C/min and weight loss of the specimen was automatically recorded. The conditions of reduction of the blocks did not differ from conditions in the initial granular catalyst. Due to the high porosity, binder does not prevent transportation of the reducing gas to the catalyst grains. Specimens

of blocks sintered under high temperature conditions had lower temperatures of beginning of reduction than the initial catalyst or blocks sintered at 550°C. Figures 1; references 8 (Russian).

6508/9835  
CSO: 1841/289

UDC 541.128.13

EFFECTS OF MOLYBDENUM AND TUNGSTEN OXIDES ON THERMAL STABILITY OF IRON-COBALT CATALYSTS FOR AMMONIA SYNTHESIS

Minsk VESTSI AKADEMII NAVUK BSSR: SERIYA KHMICHNYKH NAVUK in Russian No 6, Nov-Dec 85 (manuscript received 5 Sep 84) pp 30-33

[Article by V. S. Komarov, A. T. Rozin, G. S. Lemeshonok and S. I. Yeremenko, Institute of General and Inorganic Chemistry, Belorussian SSR Academy of Sciences]

[Abstract] An assessment was conducted on the effects of  $WO_3$  and  $MoO_3$  on the thermal stability and catalytic activity of Fe-Co catalysts intended for ammonia synthesis. Addition of 5 wt% MgO or of 3 wt%  $Al_2O_3$  to the catalysts as structure-forming agents diminished catalytic activity somewhat despite an increase in the specific surface areas. Addition of 0.5, 1.0 or 1.5 wt%  $WO_3$  or  $MoO_3$  to the  $Fe_2O_3-Co_3O_4-MgO$  (81-14-5 wt%) catalyst resulted in diminished activity, while addition of low levels (0.5 wt%) of  $WO_3$  or of  $MoO_3$  to the  $Fe_2O_3-Co_3O_4-Al_2O_3$  (81-14-3 wt%) catalyst led to an increase in the catalytic activity by ca. 10-15%. Catalysts supplemented with 0.5 wt% of either  $WO_3$  or  $MoO_3$  also showed less loss of activity after superheating at 800°C for 6 h than did unsupplemented catalysts. The effects on catalytic activity and thermal stability were attributed to the fact that reduction of  $WO_3$  and  $MoO_3$  to the metal form occurs at higher temperatures than the reduction of iron and cobalt oxides, and that the catalytic activities of the former are lower than those of the latter in ammonia synthesis. Nevertheless, the possibility remains open that W and Mo may exert a synergistic effect on catalysis in this system. Figures 1; references 9 (Russian).

12172/9835  
CSO: 1841/340

UDC 541.64:547.458.81

PYROLYSIS OF CELLULOSE HYDRATE IMPREGNATED WITH  $H_2PtCl_6$  AND FORMATION OF PLATINUM-CARBON FIBERS

Minsk VESTSI AKADEMII NAVUK BSSR: SERIYA KHIMICHNYKH NAVUK in Russian No 6, Nov-Dec 85 (manuscript received 25 Dec 84) pp 33-37

[Article by I. N. Yermolenko and A. M. Safonova, Institute of General and Inorganic Chemistry, Belorussian SSR Academy of Sciences]

[Abstract] Comparative studies were conducted of the course of pyrolysis of cellulose hydrate and of cellulose hydrate impregnated with 0.03 M  $H_2PtCl_6$ , and on the physical chemical and catalytic activities of the Pt-C fibers formed in the latter case. Basically, the presence of  $H_2PtCl_6$  in the cellulose matrix had only a minimal effect on the derivatographic patterns, presumably due to the low concentration of  $H_2PtCl_6$  in the samples under study. However, the temperature of heat treatment had a profound effect on the catalytic activities of the resultant Pt-C fibers in terms of the benzene yield from dehydrogenation of cyclohexane and of trans-1,2-dimethylcyclopentane from isomerization of cis-1,2-dimethylcyclopentane (I), as well as of the yield of  $C_7$  hydrocarbons from hydrogenolysis of I. These differences in the catalytic activities of the Pt-C fibers were attributed to differences in the degree of dispersion of the metal and its distribution in the bulk, changes in the physical chemical characteristics of the matrix, and the mutual interaction of both phases. Evidently, Pt-C catalysts with desired selectivity can be prepared by appropriate temperature treatment of the impregnated cellulose material. Figures 3; references 10 (Russian).

12172/9835  
CSO: 1841/340

## CHEMICAL INDUSTRY

### MINISTRY OF CHEMICAL INDUSTRY DEFENDED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 20 Dec 85 p 2

[Article by L. Osipenko under "The Newspaper Has Come Out. What Is To Be Done?" rubric: "Fog at the Turn" (A response to earlier article by the same name)].

[Text] The scientific-research subdivision of the Ministry of the Chemical Industry was subjected to serious criticism in an article by Ye. Leontyeva published under such a headline ["Fog at the Turn"] in the 10 August 1985 issue of SOTSIALISTICHESKAYA INDUSTRIYA. Analysis of its work showed major deficiencies in the development of new methods and technologies.

L. Osipenko, first deputy minister, has responded to the editorial: criticism directed at the ministry was acknowledged to be correct. As he reported, the necessary measures for fuller satisfaction of demands for consumer goods which are high-quality kinds of production and which determine the scientific and technical progress of the consuming sectors of USSR industry have already been worked out today. The allocation of more than 70 percent of capital investments for expansion, modernization, and technical retooling of enterprises is specified in the 12th Five-Year Plan, and this makes it possible to obtain more than a 50 percent increase in commodity production as early as 1986. As the basis of its plans, the ministry incorporates the latest scientific and technical achievements with regard to the results of the certification conducted of technological processes and work places. An inventory of all finished scientific research work has been conducted also for this purpose, and the time period for their implementation has been decided.

The ministry also is completing the formation of state and sector programs in which the priority directions of development of chemical science and industry are determined. This is the putting into production of new kinds of plastics; the manufacture of chemical fibers and filaments replacing natural raw materials in material; and the development of low-tonnage chemistry, membranes and membrane technology, and highly effective catalysts.

In the 12th Five-Year Plan, because of the implementation of these programs and wide introduction into production of the achievements of scientific and technical progress, it is planned to increase production volume considerably without an increase in the labor force, to lower the cost of chemical production by

700 million rubles, and to certify more than 50 percent of production as the highest quality category.

The problems of raising the technical level of the sector also determine the new requirements for science of the sector, which must be oriented toward creating high-level developments, a level which is equal to the best world achievements or exceeds them. In this connection, the ministry pays special attention to the extension of cooperation with academic and higher education science, especially in the devising of new generation technological processes. At the present time, an inspection is being made of the topical plans of work for the 12th Five-Year Plan of all scientific research organizations, in order to concentrate the basic strengths of scientists on the solution of important problems of the sector. The structure of each separate organization is being reviewed also. As the result of this, 16 independent inefficient scientific subdivisions have been abolished, and industrial science is being strengthened.

Scientific Research Associations will be established by means of merging Scientific Research Organizations, Design Offices and planning organizations, which will enable the "research-production" cycle to be shortened by a factor of 1.3-1.5. At the present time, 21 scientific-production associations have been established, and it is planned to establish 12 more. Their tasks are not only the conduct of scientific research and planning work but also the organization of the adoption of their developments, including the conduct of start-up work and work on making new industrial production operational. Such a rearrangement of forces enabled personnel of the science sector to be reduced by 3,000 persons.

Personnel policies occupy an important place in the improvement of the management of scientific and technical progress. Problems of strengthening the remaining sections and selection and promotion of personnel who are capable of successfully implementing the decisions of the party in a new setting with complete efficiency were discussed at a special meeting of the staff on 16 August. A whole series of measures also were determined which were directed at the improvement of the training and retraining of young scientists, project planners, and designers.

Together with the Central Committee of the Trade Union of Workers of the Chemical and Petrochemical Industry, measures are being planned and implemented in the sector which are directed at maximal involvement of workers in the campaign for scientific and technical progress, all possible economy and thrift, the development of innovations and inventions, and the introduction of outstanding brigade methods of the organization of work.

Improvement of the economic mechanism of management by the sector and its science will be continued under conditions of an economic experiment to which the ministry will be converted starting with 1986.

12410  
CSO: 8144/0710A

CERTIFICATION OF WORK SITES--RESERVES FOR INCREASED PRODUCTION  
EFFECTIVENESS

Moscow KAUCHUK I REZINA in Russian No 12, Dec 85 pp 24-26

[Article by V. R. Vyatsira]

[Abstract] Certification of work sites plays an important role in increasing production effectiveness and acceleration of scientific-technical progress. During the certification process, a thorough analysis of the organization of labor is performed along with determination of its level and productivity. Success of each worker depends on the equipment provided for the working station. Certification of working conditions is extremely important in petrochemical industry where considerable effort is still consumed by non-productive monotonous labor. A plan was developed for performing the certification on a large scale. Several factories began work site certification operations on their own and have been performing them annually for the past 2-3 years. PR work (agitation) is very important in mobilizing the workers to participation in these operations; concrete achievements and benefits must be highlighted and disseminated to all echelons. Certification is an important problem and should not be postponed for a later date.

7813/9835  
CSO: 1841/343

CERTIFICATION AND RATIONALIZATION OF WORKING SITES AT CHEMICAL ENTERPRISES

Moscow KHMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 12,  
Dec 85 pp 31-34

[Article by V. F. Litvitskiy, candidate of Economics Sciences]

[Abstract] In August 1985, the USSR Soviet Council of Ministers decided to carry out an all encompassing certification of all working sites and their rationalization in industry and in other branches of national economy. This was designed to lead to technical refitting, introduction of automation and creation of more pleasant working conditions. During certification process, technical, economical and organizational characteristics of work

sites were determined; rationalization of work sites included development of concrete measures designed to achieve the projected goals. The certification process begins by grouping the workers by certain categories, available equipment, degree of mechanization, number of shifts, by occupations, work conditions, etc. Total inventory of work sites must be made regardless of whether they are operational or not. Various commissions supervise and analyze this process at several vertical tiers. A numerical value is assigned to several aspects reviewed in this process and an index is then developed on the basis of which decisions are made as to the action to be taken on each of the sites. This process is performed annually, the results being approved by chief engineer.

7813/9835  
CSO: 1841/328

UDC 621.65.002.2

CONTRIBUTIONS OF CHEMICAL MACHINE ENGINEERS TO AGROINDUSTRIAL COMPLEXES

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 12,  
Dec 85 pp 38-40

[Article by Yu. N. Levitskiy]

[Abstract] Many lines of new equipment for production of mineral fertilizers were exhibited at the exhibition "Scientific Technical Progress--85". Several of the machines designed for agricultural application are reviewed: equipment for production of 1,500 t liquid ammonia daily; another plant for production of 700,000 t of ammophos per year; one for production of phosphoric acid with a capacity of 110,000 t P<sub>2</sub>O<sub>5</sub> per year; carbamide production equipment with capacity of 450,000 tons per year; a drum granulator-drier for a number of fertilizers, a heat-exchanger, compressor and an electric pump. Many other lines were exhibited indicating the role played by the engineers in accelerating scientific-technical progress.

7813/9835  
CSO: 1841/328

UDC: 658.52.011.56

METHODS OF NOISE TOLERANT TESTING IN AUTOMATED CHEMICAL TECHNOLOGY CONTROL SYSTEMS

Kiev KHMICHESKAYA TEKHNOLOGIYA in Russian No 6, Nov-Dec 85  
(manuscript received 10 Jun 85) pp 54-56

[Article by S. V. Altshuler, "Neftekhimavtomatika" Scientific-Production Association, Moscow]

[Abstract] A study is made of the problem of selecting noise-tolerant algorithms depending on which quantities are used for testing. A classification of programmed testing methods is presented. Monitoring based on input and output parameters of the process being controlled, monitoring using state variables of the process, monitoring using parameters of the model, and noise-monitoring based on characteristic process values are discussed. Noise-tolerant methods must be used to construct models--methods such as robust smoothing, filters, robust methods of estimating time series parameters, static and dynamic models and robust methods of restoring functions. Noise-tolerant data-processing methods should also be used for detection of inconsistencies between the model and current measurements. Figures 1; references 8: 7 Russian, 1 Western.

6508/9835  
CSO: 1841/292

CHEMICALIZATION OF NATIONAL ECONOMY

Moscow EKONOMICHESKAYA GAZETA in Russian No 52, Dec 85  
(manuscript received 23 Dec 85) p 1

[Abstract] The plan of "Basic Directions of Economic and Social Development of the USSR for 1986-1990 and for the Period to the Year 2000" envisions a rapid growth of the chemical industry with a wide use of chemical products in manufacturing, with an infusion of chemical methods into the processing of raw materials and an effect on products of labor. The 12th Five-Year Plan projects a 30-32% growth in the chemical and petroleum refining industries. Chemical production will rise to 8% of total production. Per capita production of plastics and synthetic resins will increase by a factor of 1.8-2.2, and of synthetic detergents, paints, and rubbers, by a factor of 1.3-1.5. The overall economic effect over 15 years will exceed 450 billion rubles. Priority in the 12th Five-Year Plan is given to chemical improvements in agriculture and in manufacturing of products of Group "B," as well as support for the Soviet energy program, for high-quality chemical products, for artificial fibers in commercial products, and for better use of secondary resources. By 1990, chemical fertilizer use will reach 30-32 million tons, while other agricultural chemicals will reach 440-480 thousand tons. The output of household goods

based on chemistry will increase by a factor of 1.4-1.6 during the 12th Five-Year Plan, improving satisfaction of popular demand for such items as fabrics and shoes. Industrial applications of chemistry will improve industrial efficiency and lower the unit consumption of metals, energy, and labor. Increases in polymeric construction materials will be particularly important. All this will require significant capital investment; for example, the output of more efficient equipment in the chemical and petroleum industries will increase by a factor of 1.3-1.5 in the 12th Five-Year Plan. Rapid growth will begin in 1986 in synthetic resins, new fertilizers, plastics, chemical fibers, and such basic chemicals as caustic soda and methanol. This will require significantly improved labor quality from all chemical workers to attain a breakthrough in the use of intensive factors of growth and to guarantee a rapid infusion of scientific-technical progress. At the same time, losses due to deterioration in transit and storage must be reduced. Figures 1.

12672/9835  
CSO: 1841/359

COMBUSTION

UDC 546

IMPORTANCE OF CONTACT MELTING IN NONGASEOUS COMBUSTION

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 286, No 4, Feb 86  
(manuscript received 1 Mar 85) pp 911-914

[Article by Yu. M. Maksimov, A. G. Merzhanov, L. G. Raskolenko,  
A. T. Pak and O. K. Lepakova, Scientific Research Institute of Applied  
Mathematics and Mechanics, Tomsk State University imeni V. V. Kuybyshev]

[Abstract] The importance of contact melting was analyzed for Ti-B-Fe system calculated to yield a final  $TiB_2$  product with 21.0 to 71 wt% Fe as a result of eutectic melting. Analysis of the graphic data and temperature distribution along the wave of combustion and velocity of combustion demonstrated that contact eutectics appear to be the source of the fluid phase at the front. With an increase in the temperature the eutectic melts fuse forming a single melt. The latter serves as a sink for the intermediate products, suggesting that even in the initial stages of combustion, the eutectic fluid phase facilitates diffusion processes, increases the contact area, and activates combustion. Figures 3; references 7 (Russian).

12172/9835  
CSO: 1841/372

## ELECTROCHEMISTRY

### NEW ELECTRODE TECHNOLOGY

Moscow IZVESTIYA in Russian 30 Nov 85 p 4

[Article by I. Novodvorskii]

[Text] On 29 Nov 85, the USSR State Committee on Inventions and Discoveries registered a discovery made by a group of colleagues at the Institute of Electrochemistry, USSR Academy of Sciences im. A. N. Frumkin: Dr. of Chemical Sciences D. Leykis and Candidates of Chemical Sciences I. Astakhov, I. Kiselev, and D. Aleksandrova.

Alkali metals such as sodium, when dissolved in water, cannot deposit onto solid metal electrodes placed in that solution. This was a generally acknowledged fact. It was thought that if an alkaline metal ion did settle on an electrode, the atom would change so that it would be washed away, entering into a chemical reaction with water.

However, the authors of the discovery experimentally showed and theoretically explained that in certain conditions, alkali metal ions do bind to defects in the crystal lattice of electrodes. In this manner, a composite layer of both metals is formed.

The phenomenon of electrochemical implantation (as the authors named their discovery) provides an explanation for a number of anomalies in electrochemical processes. Electrode reaction methods have been developed, making the electrodes more "hospitable" for alkali metal atoms. Thanks to this, alloys have been successfully produced at room temperature, among them some whose preparation was previously considered simply impossible. On the basis of the discovery, a method of activating aluminum electrodes has been developed which allows the power of electrochemical current sources to be increased.

/9835  
CSO: 1841/405-P

UDC 539.893:537.312.9:539.19

STATIC UNIAXIAL COMPRESSION AND ENERGY OF ACTIVATION OF CONDUCTIVITY OF  
PHTHALOCYANINE-BIVALENT METAL COMPLEXES

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 286, No 2, Jan 86  
(manuscript received 18 Feb 85) pp 364-367

[Article by Yu. A. Berlin, N. G. Daniyelyan, S. I. Beshenko, V. A. Zhorin  
and N. S. Yenikolopyan, academician, Institute of Chemical Physics, USSR  
Academy of Sciences, Moscow]

[Abstract] An analysis was conducted on the effects of static uniaxial compression of phthalocyanine-bivalent metal complexes--NiPc, CoPc and ZnPc--on the energy of activation ( $E_a$ ) of conductivity ( $G$ ), with the pressure parameter maintained below the critical level [Berlin, Yu. A. et al., Chem. Phys. Lett., 83(3):564-567, 1981]. An anomalous behavior of  $E_a$ , showing an initial increase to a maximal value and then a decrease as the pressure was raised over a temperature range of 293-373 K, was attributed to the fact that  $E_a$  was less than the forbidden zone ( $E_g/2$ ). For the complexes in question the respective  $E_a$  and  $E_g/2$  values for CoPc, ZnPc and NiPc were, respectively,  $0.1 \pm 0.05$  and  $0.8 \pm 0.025$  eV,  $0.15 \pm 0.02$  and  $0.9 \pm 0.1$  eV, and  $0.15 \pm 0.05$  and  $0.8 \pm 0.03$  eV. The data were consonant with the interpretation that electrical conductivity of these organic semiconductors is due to generation of charge carriers rather than to thermally-activated electron transfer from the valency zone to the conductivity zone.  
Figures 3; references 8: 4 Russian, 4 Western.

12172/9835  
CSO: 1841/374

UDC: 621.357.7

INFLUENCE OF STIMULATORS OF CERAMIC POWDER COPRECIPITATION ON  
ELECTROPRECIPITATION OF NICKEL

Vilnius TRUDY AKADEMII NAUK LITOVSKOY SSR: SERIYA B in Russian No 5,  
Sep-Oct 85 (manuscript received 22 Jun 84) pp 3-9

[Article by V. V. Skrobotskaya, D. K. Ramanauskene, Institute of Chemistry  
and Chemical Technology, Lithuanian Academy of Science]

[Abstract] A study is presented of the influence of various classes of coprecipitation stimulators on the cathodic process of electroprecipitation of Ni. Use was made of the Watts nickelidizing electrolyte (g/l):  $\text{NiSO}_4 \cdot 7\text{H}_2\text{O}$ --300,  $\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$ --45,  $\text{H}_3\text{BO}_3$ --30. Stimulators studied included 1,2-diamino propane (DP), methyl violet (MV) and aminodiethyl triethoxysilane (AS). At 20°C the additives inhibit the process of electroprecipitation of nickel, in the following sequence: AS > DP > MV. The inhibiting effect is found to be directly related to the number of N atoms in the molecule. The inhibiting effect results from their interaction with the cathode, causing redistribution of the rates of parallel cathodic reactions and alkalinization of the cathode layer. The cationic substances are not adsorbed onto the cathode, but rather interact with it physically, due to electrostatic forces. Figures 6, references 12: 7 Russian, 5 Western.

6508/9835  
CSO: 1841/291

UDC: 541.134.5:543.257.1

STUDY OF NITRATE-SELECTIVE SOLID CONTACT ELECTRODES WITH INTERNAL  
OXIDATION-REDUCTION SYSTEM

Leningrad VESTNIK LENINGRADSKOGO UNIVERSITETA: FIZIKA, KHIMIYA  
in Russian Vol 25, No 4, Nov 85 (manuscript received 21 Jan 85) pp 99-102

[Article by K. Kh.-Y. Leys, D. V. Sayenko, Z. S. Alagova, O. K. Stefanova  
and Ye. A. Materova]

[Abstract] A common type of ion-selective solid contact electrode consists of an electron conductor onto which an ion-selective membrane is applied. This type of electron has unstable potential, apparently a result of nonequilibrium processes occurring at the boundary between the conductor and the membrane. Oxidation-reduction systems insoluble in the plasticizer and water, located at the surface of the conductor, have been suggested to stabilize the potential. The present study was intended to improve methods of manufacture of solid contact electrodes and determine the optimal composition of the inner layer of the membrane containing the stabilizing system.

A prepared 2-layer membrane was glued to the graphite inner conductor. The inner layer contained EI-21 electron exchanger in mixed copper-hydrogen form plus carbon black. This method allows reliable expansion of the usage of solid contact electrodes, and is easy to perform technology. Figures 2; references 9: 5 Russian, 4 Western.

6508/9835  
CSO: 1841/301

UDC 541.138:621.315.592

PHOTOSTIMULATED ELECTROLYSIS OF WATER OVER HETEROGENOUS BILAYERS OF TITANIUM,  
BISMUTH AND TUNGSTEN OXIDES

Minsk VESTSI AKADEMII NAVUK BSSR: SERIYA KHMICHNYKH NAVUK in Russian  
No 6, Nov-Dec 85 (manuscript received 10 Mar 85) pp 25-30

[Article by D. V. Sviridov, S. K. Poznyak, V. V. Sviridov and A. I. Kulak,  
Scientific Research Institute of Physical Chemical Problems; Belorussian  
State University imeni V. I. Lenin]

[Abstract] Expansion of current information on photoelectrochemical processes was secured by studies on heterogenous structures consisting of bilayers of Ti-TiO<sub>2</sub>, W-WO<sub>2</sub> and Bi-Bi<sub>2</sub>O<sub>3</sub>, as well as W-WO<sub>3</sub>-TiO<sub>2</sub>, Bi-Bi<sub>2</sub>O<sub>3</sub>-TiO<sub>2</sub>, and Ti-TiO<sub>2</sub>-Bi<sub>2</sub>O<sub>3</sub> systems, in photostimulated electrolysis of water (0.5 N Na<sub>2</sub>SO<sub>4</sub>, pH 6.5). Analysis of the current-potential relationships for the different systems using 250-420 nm light with intensities from  $5 \times 10^{-5}$  to  $1.6 \times 10^{-4}$  W·cm<sup>-2</sup> demonstrated that many of the oxide-oxide systems function as photoelectrochemical cells consisting of two photogenerators. The photocurrents from each layer are additive, which contributes to the spectral sensitivity of the photoanodes and enhances resistance to corrosion. A complicating factor noted in some situations is the creation of a boundary barrier limiting the transfer of photon-induced electrons, a factor that can seriously impair the contribution of the external oxide layer to the total current flow. Figures 2; references 4: 3 Russian, 1 Western.

12172/9835  
CSO: 1841/340

UDC 541.135

### ELECTROCHEMICAL CELL FOR HIGH-TEMPERATURE ELECTROLYSIS

Minsk VESTSI AKADEMII NAVUK BSSR: SERIYA KHMICHNYKH NAVUK in Russian  
No 6, Nov-Dec 85 (manuscript received 8 Apr 85) pp 41-43

[Article by G. I. Novikov, I. E. Chirkun, N. M. Gamanovich, V. P. Pakhomov,  
and Yu. S. Toropov, Belorussian Technologic Institute imeni S. M. Kirov]

[Abstract] Hot casting under pressure was employed in the preparation of a four-component ceramic material suitable for use in electrochemical cells for the hydrolysis of water. The solid electrolyte with the composition ZrO<sub>2</sub>-Y<sub>2</sub>O<sub>3</sub>-CaO-MgO (88.8, 8.0, 2.3 and 0.9 mol. parts) was examined under an electron microscope and subjected to conductivity vs. temperature analysis. Electron micrographs demonstrated that the matrix consisted of distinct cubic structural elements, while the conductivity measurements indicated that the electrolyte could be used in high-temperature electrolysis of water vapor. Figures 2; references 6 (Russian).

12172/9835  
CSO: 1841/340

UDC 549.67:542.936

### ELECTROCONDUCTIVITY OF ZEOLITE A IN SODIUM FORM

Novosibirsk IZVESTIYA SIBIRSKOGO OTDELENIYA AKADEMII NAUK SSSR: SERIYA KHMICHESKIYE NAUKI in Russian Vol 17, No 6, Nov-Dec 85  
(manuscript received 21 May 85) pp 79-88

[Article by G. R. Karagedov, Institute of Solid State Chemistry and Processing of Crude Minerals, Siberian Department, USSR Academy of Sciences, Novosibirsk]

[Abstract] The results of a number of studies devoted to changes occurring in electroconductivity of zeolites have been contradictory. Because of this, electroconductivity of NaA zeolites was determined on compressed tablet samples with different water content. It was shown that electroconductivity decreased with dehydration of NaA. The mechanism of this process is discussed. The principal hydration process of NaA is related to protonic and cationic conductivity with insignificant contribution of electronic current component. At the initial stage of hydration, a "protolysis" of water molecules takes place due to their interaction with Na<sup>+</sup> cations localized in 8-membered windows and the O<sup>2-</sup> ions of zeolite framework. At this stage, protons contribute significantly to conductivity of zeolite. With increased water content, Na<sup>+</sup> cations localized in 6-membered windows are hydrated. Here NaA zeolite behaves as an electrolyte with sodium conductivity. In completely hydrated zeolite (26--27 H<sub>2</sub>O molecules

per unit cell) the conductivity is determined principally by proton transfer. Figures 5; references 27: 13 Russian (1 by Western author), 14 Western.

7813/9835  
CSO: 1841/326

UDC: 541.138:620.197/199:678.742.2.06-416

#### CATHODE DELAMINATION OF POLYMER COATINGS

Leningrad ZHURNAL PRIKLADNOY KHMII in Russian Vol 58, No 11, Nov 85  
(manuscript received 10 Sep 84) pp 2562-2565

[Article by G. S. Shapoval, V. A. Vagriy, V. K. Skubin and A. A. Kachan,  
Department of Petrochemistry, Institute of Physical-Organic Chemistry  
and Coal Chemistry, Ukrainian SSR Academy of Sciences

[Abstract] The kinetics of the process of delamination of polymer coatings was studied using a special rapid method based on potentiostatic polarization of the substrate in combination with automatic recording of current proportional to the area of delamination. The coating material used was a copolymer of ethylene and vinyl acetate containing 12% acetate groups. Coatings were applied to deoxidized and degreased steel plates by hot pressing at 450K and 0.01 MPa, 30 minutes. The rate of delamination in acid in which intensive liberation of hydrogen occurs is an order of magnitude lower than in a neutral medium, in spite of a 20 times increase in cathode current. In an alkaline medium, some decrease in delamination rate is also observed in comparison to a neutral medium. The addition of NaCl to the alkaline and particularly acid solutions with unchanged pH significantly accelerates delamination. The rate of the process is thus significantly determined by the nature and concentration of cations in the layer near the electrode. The rate of delamination was found to increase with increasing ion radius. A possible mechanism is suggested for this.  
Figures 4; references 10: 5 Russian, 5 Western.

6508/9835  
CSO: 1841/289

UDC: 541.135.5

GERMANIUM ION SELECTIVE FIELD-EFFECT TRANSISTORS

Leningrad ZHURNAL PRIKLADNOY KHMII in Russian Vol 58, No 11, Nov 85  
(manuscript received 1 Apr 85) pp 2552-2555

[Article by Yu. G. Vlasov, V. P. Letavin and Yu. A. Tarantov, Leningrad State University imeni A. A. Zhdanov]

[Abstract] A study is performed for the first time of the ion sensitivity of an electrolyte-dielectric-germanium system and germanium ion-selective field-effect transistors. A planar technology developed for the production of metal-dielectric-semiconductor structures and germanium-based MOSFET devices was used to create the germanium-dielectric and germanium ISFET devices. The influence of pH of the electrolyte on the volt-farad characteristics of the electrolyte-dielectric germanium system and the volt-ampere characteristics of the ISFET was studied. The volt-farad characteristics have a form typical for germanium MOS structures. The volt-ampere characteristics of the ISFET with  $\text{SiO}_2\text{-Si}_3\text{N}_4$  dielectric layer corresponds to the similar characteristics of germanium field-effect transistors with aluminum gate and follow the known relationships for MOSFET devices. The germanium-dielectric structure has lower stability of electrophysical properties in contact with an aqueous electrolyte than silicon-dielectric structures, as well as hysteresis upon second exchange of solutions with different value of pH, and also, an irreversible reduction in pH sensitivity upon long exposure to aqueous solutions with pH 6.4. The studies indicate the possibility in principle of creation of ISFET on the basis of germanium. Figures 3; references 5 (Russian).

6508/9835  
CSO: 1841/289

FERTILIZERS

UDC 631.85:631.89

PHYSICAL PROPERTIES OF AMMOPHOSPHATE AND QUALITY OF DRY CONCENTRATED  
FERTILIZER MIXTURES BASED ON IT

Moscow AGROKHIMIYA in Russian No 11, Nov 85 (manuscript received 1 Nov 84)  
pp 22-34

[Article by N. L. Malonosov, V. A. Kagranova, T. A. Vyugina and Z. F. Ryabova,  
Scientific Research Institute of Fertilizers Insecticides and Fungicides  
imeni Ya. V. Samoylov]

[Abstract] In connection with development of new technology for production of phosphorus fertilizers which depend on concentrated products with minimal use of sulfuric acid, a new technique was developed at the Almalik Chemical Plant for production of granulated phosphorus-nitrogen fertilizer--ammophosphate (AMP). The physical-mechanical properties of AMP were evaluated: chemical composition, hydroscopic property, caking, granular strength, pouring, dispersion, etc. In production of AMP local ore from Karatau was used ( $P_2O_5$  at least 24.5%,  $MgO$  up to 3.5% and  $CO_2$  up to 8.0%). Analysis of experimental data showed that granulated AMP contained 65-70% water soluble  $P_2O_5$  and did not cake, had a moderate hydroscopicity, high granular strength, and good pouring and dispersion. It stored well and could be used to prepare solid mixtures of PK-, NP- and NPK fertilizers from ammonium nitrate and potassium chloride. These mixtures stored well for 4-6 months and therefore could be prepared well in advance of the application time. Figures 4; references 6 (Russian).

7813/9835  
CSO: 1841/317

UDC 631.842(088.8)

CARBAMIDE CONDITIONING IN INSTRUMENTS WITH PSEUDOLIQUEFIED LAYER

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHMICHESKAYA TEKHOLOGIYA in Russian Vol 28, No 11, Nov 85 (manuscript received 26 Mar 84) pp 78-80

[Article by L. N. Ovchinnikov, V. A. Kruglov, A. G. Lipin and V. N. Kiselnikov, Department of Processes and Apparatus, Ivanovo Chemical-Technologic Institute]

[Abstract] Considerable attention is given to storage and application properties of mineral fertilizers. Many past problems are being solved by deposition of films on fertilizer granules. This is done optimally in a boiling layer (BL) apparatus which makes it possible to control the contact time between the fertilizer and the encapsulating agent. This aspect is especially important when urea formaldehyde (UF) compounds are used as conditioning agents. Deposition of UF film on carbamide granules was studied. For deposition of 1, 2 and 3% of the solid UF phase, the fertilizer should be kept in the conditioning apparatus at least 5, 13 and 26 minutes respectively. It was shown that this method of conditioning improved considerably the physical-mechanical properties of fertilizers. Figures 2; references 9 (Russian) (1 by Western author).

7813/9835  
CSO: 1841/336

UDC 661.663.3:537.523

STUDY OF SYNTHETIC PROCESSES FOR CONCENTRATED PHOSPHORUS-POTASSIUM FERTILIZERS UTILIZING LOW TEMPERATURE PLASMA (Part 2)

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA KHIMICHESKAYA in Russian No 6 (234), Nov-Dec 85 (manuscript received 27 Sep 83) pp 3-8

[Article by V. P. Voychak, N. Ya. Dyankova, Sh. Sh. Ibrayev, S. I. Kalmykov and V. Ye. Messerle, Institute of Chemical Sciences, KaSSR Academy of Sciences, Alma-Ata]

[Abstract] In a previous study, thermodynamic analysis of the production of P-K fertilizers was reported which led to development of high-temperature processing of phosphorites. In the present paper, experimental results are reported of the production of concentrated P-K fertilizers using low temperature plasma. This single stage process made it possible to obtain, directly from the natural source, highly concentrated chlorine-free P-K fertilizer containing up to 97% of nutrients. The product is easily absorbed by the plants and can be used on all cultures including the chlorophobic ones. Hydrochloric acid is produced in this process with

a 30-35% concentration and can be used as a technical product. This study was only an explanatory attempt to prove the principle of this approach. Next, it would be necessary to scale it up to commercial scale.  
References 6 (Russian).

7813/9835  
CSO: 1841/322

UDC: (631.893.1'2'3:613.812):546.41'175

CONDITIONING OF NITROAMMOFOSKA AMMONIUM FERTILIZER WITH CALCIUM NITRATE

Leningrad ZHURNAL PRIKLADNOY KHMII in Russian Vol 58, No 10, Oct 85  
(manuscript received 22 Jul 83) pp 2332-2334

[Article by A. L. Goldinov, O. B. Abramov and Ye. V. Afanasenko]

[Abstract] Nitroammonofoska requires special treatment, or conditioning, to prevent caking. The most reliable caking prevention is treatment of the surface of the granules with surfactants with subsequent dusting with a powder with high specific surface. This article presents results of studies of the effectiveness of calcium nitrate as a conditioning substance. The results indicate that with a residual moisture content of about 0.5% by weight, application of 1% calcium nitrate is sufficient to prevent caking. With a residual moisture content of 1%, the quantity of calcium nitrate added should be increased to 2%. With residual moisture content 1.4%, treatment with calcium nitrate still reduces caking but does not prevent it. The recommended treatment is processing of granules of nitroammonofoska with a melt of calcium nitrate tetrahydrate 1.5 wt.% with subsequent drying of the granules to a residual moisture content of not over 0.5% and cooling to a temperature of not over 30°C, which assures 100% pourability of the product after 6 months storage in polyethylene bags. References 6: 5 Russian, 1 Western.

6508/9835  
CSO: 1841/289

UDC 541.123.31.62+546

CHEMICAL AND TECHNOLOGICAL ASPECTS OF COMPLEX FERTILIZERS SUPPLEMENTED WITH TRACE ELEMENTS

Tashkent UZBEKSKIY KHMICHESKIY ZHURNAL in Russian No 5, Sep-Oct 85  
(manuscript received 22 May 85) pp 42-46

[Article by M. N. Nabiiev and S. Tukhtayev, Institute of Chemistry, Uzbek SSR Academy of Sciences]

[Abstract] A brief review is presented of the chemical and technological aspects of complex fertilizers supplemented with trace elements and employed under the conditions prevalent in Uzbekistan. It has been unequivocally demonstrated that one of the most effective agrochemical and economical means of increasing the effectiveness of mineral fertilizers in improving crop quality and harvests is to combine them with trace elements. This assures uniform application of the trace elements at critical times, and reduces costs involved in transportation, storage, and application. Years of experience and field trials have led to the development of optimal technology for the preparation and use of ammophos, simple and double superphosphate, carbamide and potassium sulfate supplemented with copper, zinc and cobalt. Today, trace element fertilizers are used over an area of 1.5 million hectares in Uzbekistan, increasing the cotton harvest by more than 250 thousand tons per year and giving the agricultural enterprises approximately 200 million rubles in additional income. References 12 (Russian).

12172/9835  
CSO: 1841/327

LIQUID AMMONIACAL-SULFOPOLYPHOSPHATE FERTILIZERS

Tashkent UZBEKSKIY KHMICHESKIY ZHURNAL in Russian No 5, Sep-Oct 85  
(manuscript received 10 Oct 84) pp 53-56

[Article by A. U. Erkayev and Sh. S. Namazov, Institute of Chemistry, Uzbek SSR Academy of Sciences

[Abstract] High-temperature neutralization of sulfopolyphosphoric acids with ammonia was utilized for the preparation of liquid ammoniacal-sulfo-polyphosphate fertilizers. The optimal  $\text{NH}_3:\text{P}_2\text{O}_5$  ratio was determined to fall within the 2.9-3.15 range at a reaction temperature of 270-280°C. Tabulated data are provided on the physical and chemical characteristics of the liquid fertilizers, with the notation that the concentration of nutrient substances ranged from 43 to 48.5%. Products with a pH of 5 or 6 were stored successfully for 6 months without precipitate formation. The temperature of crystallization was determined to be in the 14.6-26.7°C range, indicating that long-term storage is possible throughout the year. Figures 1; references 9 (Russian).

12172/9835  
CSO: 1841/327

UDC 631.812.20

PRODUCTION OF COMPLEX LIQUID FERTILIZERS FROM POOR KARATAU PHOSPHORITE

Moscow KHIMIYA V SELSKOM KHOZYAYSTVE in Russian No 10, Oct 85 pp 57-58

[Article by L. V. Konyakhina, candidate of chemical sciences,  
T. V. Tokmakova, V. A. Zarubina, N. N. Malakhova and S. M. Yershova,  
Voskresensk Branch, Scientific Research Institute of Fertilizers and  
Insectofungicides]

[Abstract] A method was devised for the production of complex liquid fertilizers from the poor Karatau phosphorites by rectification of the phosphoric acids with tri-n-butyl phosphate (TBP). The solution was boiled down to 64% P<sub>2</sub>O<sub>5</sub> and treated with gaseous ammonia at 200-300°C to give a liquid fertilizer equivalent, in all essentials, to standard liquid fertilizer 10-34-0. Kerosene was used as the diluent for the preparation of 50% TBP used in the process.

12172/9835  
CSO: 1841/379

UDC 631.893;541.6:633.51

EFFECTS OF COMPLEX POLYMERIC FERTILIZER ON CORN PRODUCTIVITY ON DARK-CHESTNUT SOLONETZ SOIL

Moscow KHIMIYA V SELSKOM KHOZYAYSTVE in Russian No 10, Oct 85 pp 63-64

[Article by N. A. Yukin, candidate of agricultural sciences, Novocherkassk Reclamation Engineering Institute]

[Abstract] In order to decrease the costs of complex fertilizers containing urea, formaldehyde, trace elements, ammophos, enzymes and other nutrients, a method was developed for the heat treatment of petroleum sludge in conjunction with liquid ammonia, formaldehyde and ammophos for the preparation of suitable complex fertilizers. The resultant product was light-gray in color, slowly soluble in water with a pH of 6.5-7.0. The composition included 29% nitrogen, 9% P<sub>2</sub>O<sub>5</sub>, 7% structure-forming substances, 0.01% vanadium, 0.01% iodine, and trace quantities of copper, zinc, cobalt and manganese. Maximal harvests over a four year period on dark-chestnut solonetz of VIR-42 hybrid corn was obtained with the N<sub>90</sub> version of the fertilizer (20 tons/ha), with an average figure of 376 centners/ha. The high yields were complemented by improved protein synthesis and accumulation of phosphorus and potassium. References 5: 4 Russian, 1 Western.

12172/9835  
CSO: 1841/379

THRESHOLD OF PRODUCTION VICTORY FOR USSR MINISTRY OF FERTILIZERS

Moscow KHIMIYA V SELSKOM KHOZYAYSTVE in Russian No 12, Dec 85 pp 73-74

[Article by L. D. Ruban]

[Abstract] A recent meeting of the collegium of the Ministry for the Production of Mineral Fertilizers, held jointly with the Central Committee of the Trade Unions of Workers in the Chemical and Petrochemical Industry, reviewed trends and prospects in this branch of the national economy. In the 1981-1985 period marked progress was made in increasing the supplies of available mineral fertilizers, reaching an output of 33.4 million tons. In 1983-1984 the annual production exceeded by 30% that seen in 1981-1982, and over the entire 11th Five Year Plan the increase in the production of mineral fertilizers will amount to 44%. The Soviet capacity for the production of liquid fertilizers also showed a marked improvement with an increase in both output and variety. Introduction of innovations and restructuring in the ammonia industry resulted in a total decrease in the cost of ammonia production by 328 rubles per ton. In short, progress has been made and will continue to be made on all fronts in the Soviet fertilizer industry, with the expectation that all the plans for 1985 will have been met as a fitting contribution to the success of the coming 27th Party Congress.

12172/9835  
CSO: 1841/380

FOOD TECHNOLOGY

IMPROVING QUALITY OF FOOD IN USSR

Moscow KHIMIYA I ZHIZN in Russian No 12, Dec 85 pp 3-9

[Article by A. N. Bogatyrev, candidate of technical sciences, deputy head, Agroindustrial Complex Administration, USSR State Committee, as told to A. Iordanskiy]

[Abstract] Quantitative improvements in the Soviet food supply is but one side of the Food Program coin, with food quality representing the other side. One of the most effective and far-reaching approaches to food quality improvement and prevention of many serious nutritional disorders deals with food supplements. At the present time supplementation with vitamins lags in the USSR due to shortages in vitamin production for the specific use of the food industry. Another factor having a serious impact on food quality is dietary fiber content. New technologies are being introduced to prevent fiber loss during food processing, as well as to add fiber as a supplement to other finished products, such as bread. In the latter case, as experience in the GDR has shown, not only do the consumers benefit from dietary fiber, but also from the fact that the caloric count of such breads is reduced by 20-25%. In the USSR, measures are also being taken to limit fat intake by the creation of low-fat products. In addition, efforts have also been taken to increase the meat and milk supplies. Finally, every effort is being made to provide the Soviet consumer with food that, in addition to meeting the highest nutritional standards, is also appealing in the aesthetic sense.

12172/9835  
CSO: 1841/378

INTRODUCTION OF NOVEL FOOD PRODUCTS IN USSR

Moscow KHIMIYA I ZHIZN in Russian No 12, Dec 85 pp 9-11

[Abstract] Two recent All-Union conferences--Development of New Processes for the Production of Combined Food Products (Moscow, 1984) and Synthesis and Use of Food Additives (Mogilev, 1985)--summarized recent trends in the Soviet food industry in supplying consumers with a variety of new products. Almost 500 reports were made at the conferences, dealing with new developments and demonstrating the ingenuity of scientists and technologists in overcoming obstacles. For example, in view of the difficulty encountered in cultivating soy beans in the USSR because of climatic conditions for increasing protein production, methods have been devised for extracting and purifying edible proteins from various agricultural waste products, including wheat chaff, corn husks, sunflower husks, etc. Such products, containing all the essential amino acids, meet all the criteria required for safe human consumption. Other protein sources include single cell proteins and protein derived from marine life. Specialized products for special needs have also been devised. For example, scientists in Kiev have developed a new formulation for a sausage containing blood, milk, soya protein, vitamins and minerals specifically intended for athletes. Equally important are developments in new chemical additives that are free of toxicity and add to food appeal and keeping qualities, and the use of such natural substances as vitamin E and ascorbic acid in preservation of butter.

12172/9835  
CSO: 1841/378

INORGANIC COMPOUNDS

UDC: 669.018.29:532.216.2

CHEMICAL COMPOSITION AND MECHANISM OF FORMATION OF CERAMET FILMS IN  
CHROMIUM DISILICIDE-GLASS SYSTEM

Leningrad ZHURNAL PRIKLADNOY KHMII in Russian Vol 58, No 10, Oct 85  
(manuscript received 20 Jan 84) pp 2203-2207

[Article by M. M. Kosyakina, A. V. Yeliseyev, K. K. Muravyeva,  
I. P. Kalinkin and V. S. Krimchenko]

[Abstract] Electron microscope studies were performed of the process of development and growth of thin ceramet films in the system chromium disilicide-glass upon condensation from a vapor phase in a vacuum. The chemical and phase composition of both island and continuous films were studied, as well as the distribution of islands of various chemical composition by dimensions, kinetics of ceramet film growth and temperature variation of saturation density of the surface with islands. The films were obtained by explosive evaporation at  $1.33 \cdot 10^{-3}$  Pa using a tantalum strip evaporator at 1850 50°C. In the early stages of condensation, the film islands consist of CrSi and Cr<sub>3</sub>Si, SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub> and a glass phase. Solid films are formed in several stages, including condensation of the island structures of the amorphous SiO<sub>2</sub> phase, which then merge, development of islands of crystalline silicides and oxides and crystallized glass, then formation of the continuous film. Film growth occurs by layers, the layer formation stages repeating. At over 150°C for the glass phase and 250°C for the silicides, the growth of the islands is limited by adsorption of atoms onto the surface. Below the critical temperatures, the mechanism is limited by surface diffusion. The activation energy of seed formation for the silicides is 0.04eV, for the glass phase 0.23 0.09eV. Activation energy of surface diffusion for silicides is 0.44 0.03eV, for the glass phase, 0.33 0.07eV. Figures 2; references 7 (Russian).

6508/9835  
CSO: 1841/289

UDC 666.798.2

CORROSION OF SILICON NITRIDE-BASED CERAMICS IN STREAM OF FUEL COMBUSTION PRODUCTS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 286, No 4, Feb 85  
(manuscript received 5 Mar 85) pp 901-903

[Article by Yu. G. Gogotsi, V. V. Shvayko, V. A. Lavrenko, N. N. Zudin, V. V. Kovlyayev and I. N. Frantsevich, academician, Ukrainian SSR Academy of Sciences, Kiev Polytechnical Institute imeni 50th Anniversary of the Great October Socialist Revolution]

[Abstract] A ceramic material based on silicon nitride was tested for suitability for use in combustion engines by studies of the corrosive effects of kerosene combustion products. Samples of NKKM-83 ( $\text{Si}_3\text{N}_4$  + 30% SiC + 2% MgO) were exposed to the combustion products for 50 h at 1250°C and for 25 h at 1370°C. Electron-probe and metallographic analyses demonstrated extensive surface changes, consisting of pitting, fissure formation, pore induction, and beading, as well as chemical alterations. The latter encompassed surface accumulation of  $\text{Mg}_2\text{SiO}_4$ ,  $\text{MgSiO}_3$ ,  $\text{SiO}_2$  and, to some extent, Ti, Fe, Ca, Al, Ni, etc. By comparison, oxidation in air results in retention of a smooth surface without the extensive physical deterioration obtained with the combustion products of kerosene. These observations point to the need for testing ceramic items under actual combustion conditions in order to obtain a realistic appraisal of their work performance. Figures 2; references 8: 7 Russian, 1 Western.

12172/9835  
CSO: 1841/372

UDC: 666.635.022.66

ENERGY AND RESOURCE CONSERVING TECHNOLOGY FOR PRODUCING SILICATE MATERIALS USING ALKALINE ADDITIVES AND PROSPECTS FOR ITS USE (REVIEW)

Kiev KHMICHESKAYA TEKHNOLOGIYA in Russian No 6, Nov-Dec 85  
(manuscript received 23 May 85) pp 3-9

[Article by I. G. Kovzun, I. T. Protsenko, F. D. Ovcharenko, and L. S. Varinova, Department of Natural Dispersed Systems, Institute of Colloid Chemistry and Water Chemistry, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] The physical and chemical essence of processes of liquefaction of clay suspensions and slips has been expanded considering the significant changes in the composition of the ceramics. This article discusses the current status of the problem and prospects for utilization of complex alkaline liquefiers capable of maintaining the quality of ceramic products

while saving energy and conserving natural resources. A wide variety of substances has been tested for use as liquefiers over the past quarter century. Soluble sodium silicate glass is among the most commonly used. The manufacture of soluble sodium silicate is described. Potassium liquid glass can also be used, and is more soluble in water than sodium silicate. Chain structure sodium polyphosphates are quite interesting as independent electrolytes and components of complex alkaline liquefiers, particularly the tripolyphosphate and pyrophosphate formed by treatment of acid sodium phosphates at 300-700°C. These compounds dissociate when dissolved in water into the sodium cation and polyphosphate anions capable of forming complexes with ions of calcium, magnesium, iron and other polyvalent cations. They are quite effective as liquefiers, slowly dissolving sediments of compounds such as barium sulfate and calcium carbonate. Mixtures of sodium silicate with calcined soda or sodium polyphosphate are most effective as liquefiers.

References 60: 46 Russian, 14 Western.

6508/9835  
CSO: 1841/292

## ION EXCHANGE PHENOMENA

### ION EXCHANGERS FROM WASTE PRODUCTS

Moscow KHIMIYA I ZHIZN in Russian No 12, Dec 85 pp 19-21

[Article by M. Marfin]

[Abstract] In a recent development, scientists at the Institute of General and Inorganic Chemistry, Ukrainian SSR Academy of Sciences, have transformed a toxic, fuming chemical--titanium tetrachloride ( $TiCl_4$ )--into an efficient ion exchanger. The team headed by V. V. Strelko, doctor of chemical sciences and a State Prize laureate, found that by treating  $TiCl_4$  with phosphoric acid they could obtain titanium phosphate. Subsequently, they developed a patented technology for transforming its powder state into a gel that could be granulated. In the granular form (0.5-2 mm) the ion exchange is stable at 200-400°C and has been designated FT-27. In this manner, the Ukrainian scientists have succeeded in processing a waste product into a very valuable and scientifically useful commodity, that has already been shown effective in selective removal of cadmium ions from multicomponent mixtures, and in the removal of trace quantities of potassium from sodium salts.

12172/9835  
CSO: 1841/378

NITROGEN COMPOUNDS

UDC 669.33.66.061.5

PROPERTIES OF POLYCONDENSATED POLYELECTROLYTES SYNTHESIZED FROM  
QUATERNARY DERIVATIVES OF NICOTINAMIDE AND NOVOCAINE

Tashkent UZBEKSKIY KHMICHESKIY ZHURNAL in Russian No 5, Sep-Oct 85  
(manuscript received 20 Dec 84) pp 39-41

[Article by A. Kh. Khalmatov, Z. Sh. Asadullina, Sh. A. Abdullayev and  
K. S. Akhmedov, Institute of Chemistry, Uzbek SSR Academy of Sciences]

[Abstract] The following series of polyelectrolytes were prepared by polycondensation of nicotinamide, benzylnicotinamide, coamide and Novocaine with formaldehyde: polymethylenenicotinamide, polymethylenebenzyl chloride, polymethylenecoamide and polymethylenenovocaine. The resultant polymers underwent ammonium-salt-type of dissociation in water, with electrical conductivity predicated on the counterions  $\text{Cl}^-$  and  $\text{H}^+$  and the polycations. The electrical conductivity, viscosity characteristics, and surface tension indicated that these polymers behave as water-soluble linear macromolecules. With concentrations of 5% and greater, hydrolysis leads to undissociated macromolecules which localize at liquid-air interphase, and the polyelectrolyte solutions behave as surfactants. Figures 3; references 4 (Russian).

12172/9835  
CSO: 1841/327

ORGANOPHOSPHORUS COMPOUNDS

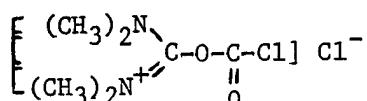
UDC 547.56+546.264'131-31:541.127

KINETICS AND MECHANISM OF CATALYTIC PHOSGENATION OF PHENOLS. Part 1.  
PHOSGENATION OF 1-NAPHTHOL IN PRESENCE OF TETRAMETHYLUREA

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 21, No 11, Nov 85  
(manuscript received 19 Jun 84) pp 2368-2376

[Article by M. S. Grabarnik, A. L. Chimishkyan, S. I. Orlov,  
S. M. Shebeko and A. L. Salmin, Moscow Chemical Technologic Institute  
imeni D. I. Mendeleyev]

[Abstract] Kinetics and mechanism of phosgenation of 1-naphthol in presence of tetramethylurea (I) was studied. Addition of I to liquid phosgene at -10°C gave an addition product of two molecules of I to one phosgene molecule: bis(dimethylimminiumdimethylaminomethyl)carbonate dichloride, a fine crystalline powder; its melting point could not be determined. Existence of an unstable intermediate product



was postulated with the conclusion that phosgene reacts with I forming 1:1 and 1:2 complexes. The results indicated that this phosgenation reaction occurred by the mechanism of nucleophilic catalysis. Figures 4; references 14: 9 Russian (6 by Western authors), 5 Western.

7813/9835  
CSO: 1841/338

UDC 547.466.3';;8.5'117

REACTION OF TRIVALENT PHOSPHORUS ACID DERIVATIVES WITH 3-AZIDO- $\beta$ -LACTAMS AND  
CHARACTERISTICS OF RESULTANT PHOSPHIMIDES

Leningrad ZHURNAL OБSHCHEY KHMII in Russian Vol 55, No 11, Nov 85  
(manuscript received 11 Jun 84) pp 2483-2489

[Article by M. N. Dimukhametov and I. A. Nuretdinov, Institute of Organic  
and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Branch, USSR Academy of  
Sciences]

[Abstract] Synthesis of novel phosphorylated  $\beta$ -lactams was achieved with the preparation of 3-azido-1,4-diarylazetidin-2-ones (I) by the [2+2]-cyclo addition reaction of azidoketene with Schiff's bases. The I compounds readily hydrolyze with elimination of alcohol (mercaptan) to yield 3-phosphamido-1,4-diarylazetidin-2-ones. Phosphimides obtained from arylalkyl phosphites undergo hydrolysis with removal of phenols. The I compounds were also found to react readily with alkyl- and acyl halides to give the corresponding 3-(N-alkylphosphamido)- and 3-(N-acylphosphamido)-1,4-diarylazetidin-2-ones. Figures 1; references 10: 3 Russian, 7 Western.

12172/9835  
CSO: 1841/345

## PESTICIDES

### PROSPECTS FOR AGRICULTURAL MECHANIZATION

Moscow ZASHCHITA RASTENIY in Russian No 1, Jan 86 pp 34-35

[Article by I. N. Veletskiy, chariman, Mechanization Section, Department of Plant Protection, All-Union Agricultural Academy imeni Lenin]

[Abstract] In order to more effectively control the use of pesticides and render the entire operation of their application more cost-effective, improvements have to be made in the existing machines used for such purposes and new technologies have to be developed. One of the most promising approaches consists of the use of pesticide aerosols, a problem worked at the VNIIIF [All-Union Scientific Research Institute of Phytopathology] and the All-Union Institute of Agricultural Electrification, with similar research efforts underway at GSKTB [State Special Technological Design Bureau] of Agricultural Machinery and the Chelyabinsk Scientific Research Institute of Agricultural Mechanization and Electrification. The Institute of Chemical Kinetics and Combustion, Siberian Department, USSR Academy of Sciences, continues its work on pesticide aerosols and improvements on the AG-UD-2 line of aerosol generators and improvements on the AG-UD-2 line of aerosol generators. Such generators were designed for closed spaces, however, although intensive research efforts are being made to devise a similar system useful in the outdoor environment. One of the problems to be overcome is the control of the aerosol cloud in the open. Aerosol particles 30  $\mu\text{m}$  in diameter or less have been found effective in field trials and diminish several-fold the amount of pesticide required to cover a given area. Generators have been produced that produce an aerosol with a mean particle diameter of 6-9  $\mu\text{m}$ . Spraying with metafos aerosol for the control of wheat thrips has shown that the same biological effect is achievable with 2- to 7-fold less insecticide than required with airplane spraying. It is important that studies be also conducted to determine that such new technologies pose no threat to the environment.

12172/9835  
CSO: 1841/371

STUDY OF KNOCK-DOWN EFFECT OF PYRETHROIDS FOR USEFUL INSECTS

Moscow AGROKHIMIYA in Russian No 11, Nov 85 (manuscript received 5 Mar 85)  
pp 108-112

[Article by O. Yu. Yeremina, S. A. Roslavtseva, M. N. Sobchak and D. Sabirova, All-Union Scientific Research Institute of Preservation of Nature and of Parks, Moscow Oblast; Tashkent Agricultural Institute; Institute of Zoology and Parasitology, UzSSR Academy of Sciences, Tashkent]

[Abstract] Synthetic pyrethroids, analogously to natural pyrethrins, are capable of causing rapid paralysis of exposed insects (knock-down) which is often of a reversible nature. Decreased sensitivity of nervous tissues in these insects is connected with the gene kdr; it is present in insects resistant to pyrethroids and determines the time required for demonstration of the knock-down effect. For useful insects this aspect has not been investigated adequately. The following objects were studied: *Habrobracon hebetor* imago, *Chrysopa carnea* and *Podisus maculiventris* larvae and imagos of *aphis lions*, *stetorus punctillum* and *pterostichus cupreus*. It was shown that there were differences in sensitivity of these insects to pyrethroids; the appearance of paralysis was evaluated as a function of the concentration of insecticide. It was shown to be possible to use an index of the knock-down effect as an indicator of the activity of pyrethroids. At least three concentrations of the agents had to be used with a two-fold dilution factor. References 6: 4 Russian, 2 Western.

7813/9835  
CSO: 1841/317

SAFETY TECHNOLOGY FOR STORAGE, TRANSPORTATION AND USE OF AGRICULTURAL PESTICIDES

Moscow ZASHCHITA RASTENIY in Russian No 1, Jan 86 pp 53-55

[Abstract] New instructions have been formulated for the safe storage, transportation and use of pesticides in agriculture by various research establishments, and have been approved by the USSR Ministry of Health and the Central Committee of the Trade Union of Agricultural Workers. In addition to practical instructions on storage and transportation and the conditions and crops under which they may be used, the new instructions also provide a classification of the pesticides on the basis of toxicological studies. The pesticides are divided into four categories of toxicity, ranging from the highly toxic ( $LD_{50}$  less than 15  $\mu\text{g}/\text{kg}$ ), to the relatively nontoxic ( $LD_{50}$  more than 5000  $\text{mg}/\text{kg}$ ). The rules and regulations covering the use of the pesticides are specific and have the force of law, and list a number of special factors that may apply in some or all situations. For example, children and adolescents to the age of 18 years are not allowed

to work with pesticides, nor are pregnant or breast-feeding women, nor those individuals with a medical contraindication. The use of pesticides for plant protection is strictly limited to those that are listed, with the use of nonlisted pesticides strictly forbidden.

12172/9835  
CSO: 1841/371

GIBBERSIB PLANT GROWTH REGULATOR APPROVED BY STATE COMMISSION ON CHEMICAL AGENTS OF PLANT PEST CONTROL

Moscow KHIMIYA I ZHIZN in Russian No 11, Nov 85 pp 2-8

[Article by V. Polishchuk, Special Correspondent Khimiya I Zhizn]

[Abstract] This article tells the picturesque story of the development of gibbersib, a powerful plant growth regulator. Gibbersib, based on gibberellin, has been found to provide a great increase in the yield of many agricultural crops when applied, as a very dilute solution, in very low doses, 30-40 g per hectare. Use of larger quantities of the substances can cause still greater increases in plant yield, but also result in exhaustion of the plants so that the yield increase is great the first year, after which the plants do not produce as much as even untreated plants. A series of careful experiments, with careful "bookkeeping" of the result over a period of years, has resulted in recommendation, by the State Commission for Chemical Agents of Control of Plant Pests, Plant Diseases and Weeds, for industrial production of gibbersib. Figures 1.

6508/9835  
CSO: 1841/293

## PETROLEUM PROCESSING TECHNOLOGY

### EFFECT OF SOVIET CANCELLATION OF PETROCHEMICAL PLANT PROJECTS ON EAST AND WEST EUROPE AND MALAYSIA

Kuala Lumpur BUSINESS NEWS in English 1 Feb 85 p 10

[Article by Patrick Cockburn, in Moscow]

[Text] The Soviet Union has scaled down plans to build four petrochemical projects, each worth more than US\$1 billion, over the next five years because it is giving priority to the re-equipment of plant.

The project to build a polyvinyl plant on the shores of Lake Baikal in Siberia has been cancelled, international bidders have been told. Another scheme to build a nylon plant at Kursk has been delayed, but might still be resurrected during the present five-year plan (1986-90).

The two projects still going ahead, for which British companies are bidding, are a polyolefin plant in the north Caucasus and a polyester plant in the Urals. The Soviet Union has recently launched a 15-year program aiming at a 150 per cent increase in the output of plastics and synthetic resins.

#### Contracts

It is still not clear when the contracts for the two plants which are going ahead will be awarded. The Minister for Foreign Trade and other senior officials have recently been changed and there is also a discrimination among Soviet foreign trade organizations to award contracts before economic policy becomes clearer.

Despite the investment priority given by the Soviet leadership to high technology and re-equipment, diplomats in Moscow do not expect a surge of orders for Western companies. They say there are two reasons for this:

Moscow wants to rely as much as possible on imports of machinery from Eastern Europe, notably East Germany and Czechoslovakia, in return for its exports of oil and gas. Senior officials say that where they cannot obtain high technology from West because of restrictive legislation they will not be prepared to accept less efficient equipment.

The level of Soviet imports from hard currency supplies will be limited by the fall in Soviet export revenues. These have been hit by a decline of

some four per cent in oil exports last year and the drop in the world oil price.

The Soviet Union needs to keep its customers for gas which has given increased leverage to consumers such as West Germany, Italy and France in the award of contracts. This was exemplified by the visit of Mme. Edith Cresson, the French Foreign Trade Minister, to Moscow to discuss increasing trade.

Paris wants the Soviet Union to redress the adverse trade balance with France which amounted to 4.5 billion francs (L410 million) in the first 11 months of last year.

/9835  
CSO: 1841/381

UDC 665.644.2.06

EFFECTS OF ZEOLITE CONTENT AND MATRIX ON CHARACTERISTICS OF CRACKING  
CATALYSTS

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 12, Dec 85  
pp 3-5

[Article by V. F. Klaptsov, B. K. Nefedov, A. A. Maslova and M. A. Khlebnikova,  
All-Union Scientific Research Institute of the Petroleum Industry]

[Abstract] An analysis was conducted on the factors determining bulk density, attrition and catalytic efficiency of cracking catalysts prepared by mechanical mixing of the components. The study was conducted with rare earth zeolite Y, used either with silicon oxide ash, clay, pseudobemite or kaolin alone or in combinations of the latter substances. The collated data showed that increasing the zeolite concentration from 10 to 50 wt% leads to a concomitant decrease in bulk density of the catalyst. Maximal catalytic selectivity was obtained with ca. 20 wt% zeolite, regardless of the matrix employed. In terms of ensuring functional stability the matrix materials ranked as follows in order of diminishing effectiveness: pseudobemite > clay > amorphous > silica > kaolin. An optimal cracking catalyst was designed, consisting of the following formulation: 20 wt% zeolite, 20 wt% pseudobemite, and 50% clay. The bulk density of this formulation was  $840 \text{ kg/m}^3$  and durability after 6 h at  $75^\circ\text{C}$  was on the order of 96 wt%. Feedstock conversion with the catalyst in question was on the order of 85 wt%. References 6: 5 Russian, 1 Western.

12172/9835  
CSO: 1841/346

UDC 621.434.057.3

ANTIKNOCK EFFECTIVENESS OF OXYGEN COMPOUNDS IN DIFFERENT FUELS

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 12, Dec 85  
pp 10-12

[Article by S. M. Livshits, I. M. Nikitin, V. A. Gladkikh and N. V. Tuktin]

[Abstract] A study was conducted on ethanol, methanol, methyl tertbutyl ether and water as antiknocking agents in model fuels based on paraffin and aromatic hydrocarbons. The model fuels consisted of isoctane and n-heptane (IH) and toluene and n-heptane (TH) mixtures representing, respectively, straight-run gasolines and gasolines obtained by catalytic cracking and refining. Methanol was more effective in IH than in TH in proportion to the octane number of the fuels (50-77), i.e., in proportion to the increase in isoctane or toluene. Analogous results were obtained with ethanol and the ether. Water, however, was more effective in TH than in IH. These findings indicate that low-octane type A-66 gasolines can be considerably improved by the addition of the alcohols and methyl tert-butyl ether, whereas the high-octane gasolines, such as A-72 and A-76, can be further improved by water. Figures 1; references 2 (Russian).

12172/9835  
CSO: 1841/346

UDC 658.27:66.012.44:66.013.5:665.6

STANDARDIZED USE OF PRODUCTIVE CAPACITIES IN REFINERY INDUSTRY

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 12, Dec 85 pp 17-18

[Article by Ye. L. Vashchilina and L. L. Savranskaya, VNIPIneft [possibly, All-Union Scientific Research and Planning Institute of Petroleum Industry]]

[Abstract] A brief review is provided of some of the factors and problems that arise in the use of productive capacities of the various refineries in assessing industrial productivity. In view of the continuous nature of the process, difficulties are encountered in properly evaluating individual refineries due to modernization programs, new technologies, and variability in the feedstock, because each factor represents an interdependent variable that changes from day to day. To have a base from which overall industrial productivity and capacity can be evaluated, it is imperative that the individual refineries be analyzed in terms of average annual productivity. References 1 (Russian).

12172/9835  
CSO: 1841/346

UDC 665.775:628.517.4:534.883.5

EFFECTS OF TEMPERATURE ON ENERGY DISSIPATION BY BITUMEN

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 12, Dec 85  
pp 22-24

[Article by V. I. Khrapko, A. N. Bodan and O. M. Taranenko, VNIIPKneft  
[expansion unknown]

[Abstract] In view of the frequent use of bitumen as vibration absorbing material, an acoustic device was employed to assess energy dissipation by a 2 mm thick bitumen coat over a temperature range of 60-90°C. The data were analyzed in terms of loss coefficient of mechanical vibration, calculated from the width of the resonance curve at resonance frequencies of 100-2000 Hz. Bitumen samples with loss coefficients greater than 0.05 were regarded as effective dissipating agents. For most of the samples effective damping was obtained in the 35-55°C range, and for a few in the 70-90°C range at 1000 Hz. The glassy transition temperature of the bitumens can be used as a criterion of the temperature interval of maximal damping, since the latter usually falls 50-59°C above  $T_g$  at 1000 Hz. Figures 1; references 6 (Russian).

12172/9835  
CSO: 1841/346

SEMINAR ON MOTOR FUEL AND OIL CHEMISTRY

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 11, Nov 85  
p 47

[Article by K. I. Bessmertnyy]

[Abstract] A seminar on the chemistry of motor fuels and oils was held at the Moscow House of Scientific and Technical Propaganda imeni F. E. Dzerzhinskii in June of 1985. A total of seven reports were presented dealing with developments in the chemistry of fuels and motor oils, as well as with the economic ramifications and the means that may be taken to increase fuel supply in the USSR. Ye. P. Seregina, V. S. Azeva and V. A. Gladkikh covered the economic importance of gasoline and diesel fuel supplies, pointing out that the supplies of diesel fuels can be increased by 6-8% if summer diesel fuel is enriched in heavy fractions by 2-3%. Furthermore, diesel fuel utilization can be decreased by 3-5% by the use of aqueous fuel emulsions, while the supplies of gasoline can be expanded by the use of gasoline-methanol combinations. In addition, fuller utilization of compressed and liquefied natural gas would significantly increase the motor fuel reserves of the Soviet Union. The latter types of fuel appears to be particularly suitable for marine motors, a topic that was covered by the presentation of V. L. Yerofeyeva and K. Yu. Chirikova. The problem of coal

conversion to usable fuels was covered by V. G. Spirkina, N. I. Proskuryakova, V. K. Yutayeva et al., dealing particularly with the chemical composition of Kansk-Achinsk coals, and the need to remove phenols from the fuel fractions. V. V. Sinitsyna (deceased), V. P. Skryabina, G. D. Makarova and their colleagues dealt with lubricant greases for electric machines used in aviation. They demonstrated that the lubricant grease SEDA can be used to replace a number of other greases currently in use, such as OKB-122-7, TsIATIM-221 and VNII NP-207, in the lubrication of bearings over a temperature range of -50 to 150°C. Trials with the Soviet lubricant greases have shown that in many respects they actually exceed the quality of lubricants produced abroad.

12172/9835  
CSO: 1841/358

#### SIBERIAN OILFIELD PRODUCTION PROBLEMS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 28 Jan 86 p 1

[Article by Ya. Ali-Zade, G. Bazhutin, Yu. Belanov, V. Zhilyakov and V. Kremer, Nizhnevartovsk-Tyuman: "Acute Angles of Samotlor"]

[Abstract] Samotlor exemplifies the critical problems of oil recovery in Western Siberia. The director of one petroleum and natural gas recovery administration indicated he had fallen far behind his January norm, despite a slightly increased recovery rate, because of a sharp jump in his daily plan from 51,000 to 62,000 tons per day. However, well output is generally dropping as water content increases, as nine out of ten shafts now require mechanical operation and as relatively poorer strata are being exploited. Samotlor needs a second wind. A production drop can be avoided by intensifying water injection and drilling, but measures still run along a route well worn with paperwork and inspection teams, but not increasing petroleum output. Samotlor is basically just beginning to mechanize. Some auxiliary services have been decentralized and vehicles no longer burn fuel and time just for a daily return to their garage area. But modernization is sorely needed. As much as a thousand tons of petroleum a day are lost from pipeline breaks; 870 kilometers need replacement. A trust was formed a year ago to do this, but has only been able to complete 56 kilometers. It lacks equipment and manpower. Likewise, expansion of a gas lift system is essential for intensified recovery. Initial installations were with imported equipment; further equipment was supposed to be manufactured in this country. But only one of twelve planned stations is in place, and it is incomplete. Further construction awaits automatic compressor stations. The first ones are due on line in the third quarter of 1987, as agreed by six ministries. But only four percent of the necessary funds have been allocated this year by the Ministry of Oil and Gas Construction to the general contractor trust. Much manual work is still necessary. In one example, removing a pipe section from a well required over half an hour, and

more than two hundred remained. Mechanized equipment can do this job efficiently, but like many other pieces of relatively simple machinery, it is typically not available. Although initial equipment orders were often filled promptly, sharp increases in requirements due to mechanization were not projected in the plans. The Ministry claims that it is not getting everything it needs. But it is clear that, whatever the reason, the equipment situation for the West Siberian oilmen is in utter confusion. As another example, Samotlor needs 270 high-capacity submersible assemblies this year and had placed an order for 345. The Ministry funded 30. But the most acute of the Samotlor angles is the number of nonworking wells. Many of these pumps are literally frozen in position aside locations where new wells are being drilled. Over 1300 wells now stand idle, a result of earlier insistence on quantity rather than quality.

12672/9835  
CSO: 1841/350

#### DELAYED EXPANSION OF PETROLEUM OUTPUT

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 28 Jan 86 p 1

[Article by Ya. Ali-Zade, G. Bazhutin, Yu. Belanov, V. Zhilyakov and V. Kremer, Nizhnevartovsk-Noyabrsk-Surgut: "What Does An Enterprise Begin With?"]

[Abstract] A key issue in the present slowdown of petroleum output in the Tyumen area is the need to identify new underground reservoirs. This shortcoming in the taut plan led to loss of tempo and overloading of existing enterprises. Last year, 14 new fields were added to the petroleum-collecting net, more than all the prior years of the Five-Year Plan. This addition will increase to the point that an average of 15 new fields will be added each year of the plan. At Noyabrsk, new areas are critical, with an increase of 11 million tons of fuel projected for the coming year. Last year in the Pogranichniy field, ten brigades operating under complex geological conditions and in close coordination with construction and extraction personnel, drilled over forty new wells and got more than 200,000 tons of petroleum. Now they now expect to get ten times that. Such an enterprise of course starts not with the drilling, but with careful preparations, ranging from documentation to infrastructure, and is usually carried out by the local party organs. Similarly, it was party initiative in the Surgut Rayon which planned the opening of several new fields. Unfortunately, such coordinated work is the exception, rather than the rule. The Yershovoye field near Samotlar was planned to already be producing thousands of tons of petroleum, but is still not on line. Roads are a serious problem, but this is partly due to red tape and inertia on their construction. Likewise, living quarters are very scarce, but a large and recently refurbished dormitory sits unused because of a lack of heating--due partly to a shift from an imported heating system, but more basically because of the failure of anyone to take charge. Two wells are due to come on line,

but no pipelines are laid to them, while the local Gosplan commission makes nonbinding resolutions. Another example of uncoordinated actions is the planning for most new fields to be opened in the first half of 1986, but the roads are only planned for the last quarter. Facilities for making pre-fabricated construction materials are available in the oblast center, and this plant works hard to complete orders early so that heavy assemblies can be moved to site before the spring thaw destroys the winter roads. However, the builders were not prepared to receive them early, so the effort went to waste. Typically, opening a new enterprise requires coordination of dozens of suppliers. In one instance, an exchange of visits between the "Uralmash" Association and officials of the Ministry of the Petroleum Industry led to rapid increase in the shipment of drilling assemblies. Conversely, however, plants of the Ministry of Chemical Machine-Building let deliveries slip to the last days of the planned delivery quarter, barely allowing enough time for the equipment to reach its planned sites. In the Tyumen North area, so many projects are done on a temporary basis, that they naturally cannot give the desired results. The question arises whether this region is spreading itself too thin to improve statistics instead of building solid projects which will provide real increases to the Tyumen output.

12672/9835  
CSO: 1841/350

PHARMACOLOGY AND TOXICOLOGY

UDC 547.854.21.8

STUDIES OF HETEROCYCLES. Part 57: HYDRATION OF 5-ARYLIDENE-2-SELENOBARBITURIC ACIDS

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 21, No 11, Nov 85  
(manuscript received 16 Jul 84) pp 2390-2402

[Article by A. V. Moskvin, G. V. Kulpina, T. L. Semakova and B. A. Ivin,  
Leningrad Chemical-Pharmaceutical Institute]

[Abstract] Arylidene derivatives of compounds with active methylene groups are excellent models for studying nucleophilic addition reactions to activated C=C bonds. Addition of water or hydroxyl ion may occur in physiological conditions altering biological properties of these compounds. Kinetics of hydroxylation of exocyclic C=C bonds of 5-arylidene-2-selenobarbituric acid in aqueous buffer solution at pH 10-12.5 was studied spectrophotometrically. This is a bimolecular first order reaction in respect to OH<sup>-</sup> and the substrate. Water molecules competed with OH<sup>-</sup> in the nucleophilic attack of the α-C atom in C<sup>α</sup>=C<sup>5</sup> bond. This is the limiting step for electron donor substituents at the aryl ring. For compounds with electron acceptors at the benzene ring, the effect of later stages is more significant leading to a bend in  $\sigma$ -correlations line at a point corresponding to the unsubstituted compound. The reaction with water was isoentropic. For the reaction with OH<sup>-</sup>, an isokinetic relation was observed with the isokinetic temperature  $\beta \approx 200K$ . Figures 4; references 15: 13 Russian (4 by Western authors), 2 Western.

7813/9835  
CSO: 1841/338

POLYMERS AND POLYMERIZATION

UDC 541.6.69

ACHIEVEMENTS OF INSTITUTE OF CHEMISTRY AND PHYSICS OF POLYMERS, UZBEK SSR  
ACADEMY OF SCIENCES IN 11th FIVE YEAR PLAN AND RESEARCH FORESEEN FOR  
12th FIVE YEAR PLAN

Tashkent UZBEKSKIY KHMICHESKIY ZHURNAL in Russian No 5, Sep-Oct 85  
(manuscript received 22 May 85) pp 29-32

[Article by S. Sh. Rashidova, Institute of Chemistry and Physics of  
Polymers]

[Abstract] A summary review is presented of the progress made in theoretical and applied polymer science at the Institute of Polymer Chemistry and Physics, Uzbek SSR Academy of Sciences, during the years of the 11th Five Year Plan. In that period of time research at the Institute concentrated on targeted modifications in various polymers, studies on the kinetics and mechanisms of action and formation of coordination compounds involving macromolecules and metal ions, and the biological activity spectra of such substances. Catalyst-polymer complexes were also studied extensively, and efficiency of polymer-based growth-regulating preparations for use in agriculture also underwent evaluation. Other areas of research included polymer forms of fungicides and antibiotics and other chemotherapeutic agents. In addition to expansion of existing lines of research at the Institute in the 12th Five Year Plan, plans have also been made to devote more effort to medical polymers. The latter trends include studies on polyfunctional immunomodulators and hemopoietic stimulants. Further studies will be conducted on the creation of new compositional materials from polymers, and detailed investigations of their physical, chemical and mechanical characteristics. References 7: 6 Russian, 1 Western.

12172/9835  
CSO: 1841/327

SEVENTH ALL UNION CONFERENCE ON "AGING AND STABILIZATION OF POLYMERS"

Moscow KAUCHUK I REZINA in Russian No 12, Dec 85 pp 36-38

[Article by S. M. Kavun]

[Abstract] This conference was held 16-19 Sep 85 in Kazan; it was organized by the USSR Academy of Sciences Scientific Council on High Molecular Weight Compounds, by the Institute of Chemical Physics, the USSR Academy of Sciences and the Kazan Chemical-Technologic Institute imeni S. M. Kirov to honor Academician N. M. Emanuel on the occasion of his 70th birthday. Emanuel's work on aging and stabilization of polymers was reviewed by B. A. Arbuzov and A. P. Kirpichnikov. Emanuel's school has advanced the field of polymer destruction under the influence of biologically-active media in living organisms. A. L. Buchachenko addressed radical reactions in solid polymers, problems of mechanical destruction and formation of new polymers during the aging process. O. N. Karpukhin analyzed kinetic classification of aging mechanisms of polymers. Other topics followed: Ye. T. Denisov on oxidation inhibition of polymers; B. N. Gordunov on production technology, assortment and use of stabilizers; G. Ye. Zaikov and A. A. Popov on the effect of stresses on reaction kinetics on polymers; G. V. Karpukhina on mechanisms of synergism of antioxidant mixtures; V. Ya. Shlyapintokh and V. B. Ivanov on photodestruction and light stabilization of polymers; Yu. A. Shlyapnikov on relationship between solubility and reaction kinetics of low molecular weight compounds and some polymers; Ya. A. Gurvich on non-staining phenolic stabilizers for resins and latexes; S. N. Kolesov and K. S. Minsker on destruction and stabilization of PVC; Al. Al. Berlin on destruction mechanism of polymers; S. M. Kavun on the use of antioxidants in rubbers and Yu. Yu. Moiseyev on quantitative aspects of polymer aging due to the action of living organisms.

7813/9835  
CSO: 1841/343

UDC 546.711 + 538.213

METAL-POLYMER COMPOSITIONS BASED ON POLYTETRAFLUOROETHYLENE AND COPPER

Novosibirsk IZVESTIYA SIBIRSKOGO OTDELENIYA AKADEMII NAUK SSSR: SERIYA  
Khimicheskiye nauki in Russian Vol 17, No 6, Nov-Dec 85  
(manuscript received 18 Dec 84) pp 107-109

[Article by I. N. Gribanova and V. L. Bogatyrev, Institute of Inorganic Chemistry, Siberian Department, USSR Academy of Sciences, Novosibirsk]

[Abstract] Metal polymer compositions (MPC) from polytetrafluoroethylene and ultradispersed copper particles were studied. These materials were obtained by thermal decomposition of copper formate in presence of highly dispersed fluoroplast-4. Thus-obtained specimens contained 2 to 34% of

copper. Structures of these MPC's were studied with x-ray phase analysis, IR spectroscopy, x-ray dispersion and thermal analysis leading to some conclusions on the distribution of copper particles in the compositions. Chemical interactions in this system were not observed. Figures 3; references 13: 11 Russian (1 by Western author), 2 Western.

7813/9835  
CSO: 1841/326

UDC: 677.051.125.42

INFLUENCE OF FORMATION CONDITIONS ON PROPERTIES OF PROFILED FILAMENTS  
OBTAINED BY AN AERODYNAMIC METHOD

Moscow KHIMICHESKIYE VOLOKNA in Russian No 6, Nov-Dec 85  
(manuscript received 6 May 85) pp 36-38

[Article by V. A. Svistunov, A. V. Genis and D. M. Reyn]

[Abstract] A discussion is presented of the influence of formation conditions on physical and mechanical properties of freshly formed profiled filaments obtained from a polymer melt by an aerodynamic method. Processes of formation and physical-mechanical properties of filaments obtained from a melt of isotactic polypropylene with various cross-sections were studied. The major technological parameters were varied over the range characteristic for the aerodynamic method of shaping polymer melts. The physical and mechanical properties of freshly formed profiled filaments and filaments with circular cross-section were compared as functions of the production conditions. The results indicated that the mechanical properties of filaments of different cross-sections obtained under identical conditions are quite similar. The relationship between strength and elongation of filaments of practically all shapes can be approximated by the same equation,  $E=1750 \exp(-0.089P)$ , where E is the elongation of the elementary filaments in percent. The results of the studies can thus be used to predict the physical and mechanical properties of freshly formed profile filaments produced by the aerodynamic method. Figures 3; references 7: 6 Russian, 1 Western.

6508/9835  
CSO: 1841/287

UDC: 620.179.11.535.321

STUDY OF PROCESS OF OXIDATION OF ACTUAL SURFACE OF ALUMINUM WITH ORGANIC COATING

Moscow ZHURNAL FIZICHESKOY KHMII in Russian Vol 59, No 11, Nov 85  
(manuscript received 23 Apr 84) pp 2855-2857

[Article by L. A. Akashev, V. I. Kononenko, V. A. Kochedykov, V. G. Lundina, Institute of Chemistry, Urals Scientific Center, USSR Academy of Sciences, Sverdlovsk]

[Abstract] An ellipsometric method was used to study the change in optical parameters of the surface, at various temperatures, of aluminum with and without a polymer coating. Thermal oxidation of the aluminum surface was performed on 99.999 percent pure aluminum specimens mechanically polished with diamond paste to a mirror smoothness, washed in toluene and either and immersed in a 1% solution of a fluorine-containing polymer in ethyl acetate. Each specimen was held at 573 K for 20 minutes, then 723 K for 10 minutes, then 823 K for 15 minutes, and finally 903 K for 40 minutes. The surface of the aluminum after treatment with certain fluorine-containing compounds was found to oxidize more slowly upon heating to 823 K than untreated surfaces. Treatment with low-molecular weight fluorine-containing polymer F-32L slows the process of thermal oxidation right up to 903 K.

Figures 3; references 9: 7 Russian, 2 Western.

6508/9835  
CSO: 1841/297

UDC: 541.14/535-15.

MEASUREMENT SYSTEM FOR STUDY OF LASER PYROLYSIS OF POLYMER MATERIALS

Moscow ZHURNAL FIZICHESKOY KHMII in Russian Vol 59, No 11, Nov 85  
(manuscript received 19 Dec 84) pp 2898-2900

[Article by S. G. Bychkov, A. V. Desyatkov, A. A. Biketov and V. G. Kim, Kazak State University imeni S. M. Kirov, Alma-Ata]

[Abstract] A measurement system has been developed allowing simultaneous recording of the loss of mass and rate of gas liberation during sampling of a specimen for chromatographic analysis as the radiation of a continuous  $\text{CO}_2$  laser strikes a specimen. The system is diagrammed and described. The maximum radiation power which can be used in the experiments is  $100 \text{ W/cm}^2$ . Sampling for chromatographic analysis can be performed either during the experiment or upon its completion. Figures 1; references 3 (Russian).

6508/9835  
CSO: 1841/297

UDC: 678.019.36

THERMAL DESTRUCTION OF POLYIMIDE FILMS BY LASER ACTION AND HEAT TREATMENT

Leningrad ZHURNAL PRIKLADNOY KHMII in Russian Vol 58, No 10, Oct 85  
(manuscript received 12 Jul 84) pp 2322-2326

[Article by B. A. Vinogradov, V. B. Kopylov, M. L. Syrkina and Yu. I. Shmagin]

[Abstract] The purpose of this work was to determine the composition of gas liberation products upon exposure of polyimide films to laser radiation and heat and to compare the destruction conversions occurring in both cases. The products of gas liberation were analyzed by highly sensitive pyrolytic gas chromatography with intermediate concentration of the gaseous products. The major gaseous products of thermolysis of the polymer were H<sub>2</sub>O, CO<sub>2</sub>, CO, NH<sub>3</sub> and H<sub>2</sub>. Processes of thermal shock and laser action produced significantly lower masses of gaseous products than progressive heating. The differences in destruction of polyimides upon exposure to progressive heating, thermal shock and laser radiation are related to the structural specifics of the polyimide (imperfect imidization) and selectivity of absorption of laser radiation. Figures 4; references 3: 2 Russian, 1 Western.

6508/9835  
CSO: 1841/289

EFFECTIVE USE OF EXHAUST GASES

Moscow KHIMIYA I ZHIZN in Russian No 12, Dec 85 pp 22-23

[Article based on USSR Authors' Certificates No 63757 and 1109555, in Otkrytiya, Obraztsy i Tovarnyye Znaki [Discoveries, Samples and Trade Marks] No 46, 1978 and No 27, 1984]

[Abstract] In order to prolong the service life of asbestos polymer sheeting used as brake lining and in shaft couplings, exhaust gases from internal combustion engines were diverted to such sites to provide a non-oxidative environment. The approach to prolonging the service life of the lining was based on the premise that the high temperatures resulting from friction in conjunction with air lead to thermooxidative breakdown of the lining and damage to the metal parts. Exclusion of oxygen in this manner was found effective in prolonging the service life of the asbestos lining two- to -eight-fold. This approach has also been found effective at oil drilling sites in prolonging the service life of drilling bits some seven-fold.

12172/9835  
CSO: 1841/378

UDC 678.01:539.4

HEAT EFFECTS ON METAL STRENGTH IN COATING WITH POLY-[3,3-BIS-(CHLOROMETHYL)-OXETANE]

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 286, No 4, Feb 86  
(manuscript received 1 Mar 85) pp 897-900

[Article by V. A. Belyy, academician, Belorussian SSR Academy of Sciences, L. S. Pinchuk and Ye. N. Sokolov, Institute of Mechanics of Metallopolymeric Systems, Belorussian SSR Academy of Sciences, Gomel]

[Abstract] An analysis was conducted on the effects of heat treatment in the preparation of metal-poly[3,3-bis-(chloromethyl)oxetane foils on metal strength to stretching forces. Studies with brass, aluminum, copper, and zinc materials demonstrated that metals in contact with the polymer showed greater strength as a result of heat treatment, with a maximal strength determined by the nature of the metal. Two factors appeared to determine the strength of samples coated with the polymer, one of which involved solubility of metal in the polymer melt. Highest solubility was ascribed to layers with an irregular crystalline structure which would otherwise predispose the metal to defect formation. In addition, permeation of the polymer into surface defects in the metal substrate was expected to exert a plasticizing effect. A second factor, leading to metal deterioration, was ascribed to thermooxidative destruction of the polymer at high temperatures (e.g., 550 K). This resulted in diminished metal-polymer cohesiveness and activation of the metal surface by free radicals formed by polymer destruction. Figures 1; references 12: 11 Russian, 1 Western.

12172/9835  
CSO: 1841/372

UDC 621.315.592+678.769

[CH(LiAlH<sub>4</sub>)<sub>y</sub>]<sub>x</sub>: ORGANIC SEMICONDUCTOR

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 38, No 12, Dec 85  
(manuscript received 22 Nov 83) pp 755-756

[Article by V. Kh. Ksipteridis, Yerevan State University]

[Abstract] Addition of a saturated solution of LiAlH<sub>4</sub> in tetrahydrofuran to polyacetylene prepared at room temperature from 60% cis- and 40% trans-form resulted in the formation of the [CH(LiAlH<sub>4</sub>)<sub>y</sub>]<sub>x</sub> complex. The latter showed an electrical conductivity of 19 ohm<sup>-1</sup> cm<sup>-1</sup>. Analysis of IR spectra showed the disappearance of an absorption band at 650 nm (characteristic of polyacetylene) and the appearance of a new band at 1350 nm, indicative of the formation of a complex with charge transfer. Figures 1; references 3 (Western).

12172/9835  
CSO: 1841/373

RADIATION CHEMISTRY

UDC 547.85.04:546.11.3

ENZYMATIC SYNTHESIS OF RADIOLABELED NUCLEOTIDES FROM RADIOLABELED PRECURSOR BASES

Leningrad RADIOKHIMIYA in Russian Vol 27, No 5, Sep-Oct 85  
(manuscript received 15 Jul 83) pp 630-635

[Article by M. D. Frank-Kamenetskaya, G. V. Knizhnikova, T. Yu. Lazurkina and N. F. Myasoyedov]

[Abstract] A method has been devised for the isolation of an enzyme preparation from *E. coli* for the efficient synthesis of radiolabeled nucleotides from the corresponding precursor base. Following lysis of the cells with lyosyme and removal of nucleic acids after addition of sodium deoxycholate and centrifugation, the key step in securing the satisfactory enzyme preparation consisted of 18 h dialysis of the supernatant against potassium phosphate buffer, pH 7.4. Prior to dialysis, the supernatant was treated with DNase and RNase preparations for removal of residual nucleic acids. The final step consisted of precipitation to 60% saturation with ammonium sulfate, with the precipitate reconstituted with the phosphate buffer containing 0.4 ml/liter mercaptoethanol and then dialyzed for a final 18 h. The enzyme preparation obtained in this manner was effective in the synthesis of [5.6-<sup>3</sup>H<sub>2</sub>]-UTP from [5.6-<sup>3</sup>H<sub>2</sub>]-uracil and ribose-5-phosphate in a 50% yield in terms of radioactivity. The molar radioactivity of the product was virtually identical with that of the precursor base, with HPLC demonstrating that the product was free of other nucleotide admixtures.  
Figures 3; references 5: 4 Russian, 1 Western.

12172/9835  
CSO: 1841/284

UDC 546.799.4:621.039.526

ISOTOPE COMPOSITION OF PLUTONIUM IN SPENT FUEL OF VVER [SIC] REACTOR:  
ALPHA- AND GAMMA-SPECTROMETRIC STUDIES AND ISOTOPE CORRELATIONS

Leningrad RADIOKHIMIYA in Russian Vol 27, No 5, Sep-Oct 85  
(manuscript received 16 Apr 84) pp 643-648

[Article by A. V. Stepanov, A. M. Fridkin, V. I. Khorev, M. A. Suvorov and  
V. V. Berdikov]

[Abstract] An analysis was conducted on the isotope composition of plutonium in spent fuel of VVER [expansion unknown] reactors, employing correlations between alpha- and gamma-spectrometric data and mass ratios of plutonium isotopes. In the alpha-spectrometric approach alpha activities of  $^{238}\text{Pu}/^{239+240}\text{Pu}$  ratios were used as the basis of correlation. Concentration of  $^{242}\text{Pu}$  on the basis of gamma-spectrometry relied on relationships between the mass ratio  $^{242}\text{Pu}/^{239}\text{Pu}$  with the gamma activity of  $^{238}\text{Pu}/^{239}\text{Pu}$  and the expression  $(^{240}\text{Pu} \cdot ^{241}\text{Pu})/(^{239}\text{Pu})^2$ . The alpha-spectrometric method in conjunction with the correlated relationships makes possible determination of the isotope composition and mass fraction of plutonium in the spent fuel with relative errors of 5-10 and 2-3%, respectively. Gamma-spectrometry, in combination with determination of the  $^{242}\text{Pu}$  component from the correlation analysis, makes possible an analysis of the isotope composition of plutonium by nondestructive means. Figures 4; references 8: 4 Russian, 4 Western.

12172/9835  
CSO: 1841/284

UDC 536:33

EFFECTS OF SELECTIVE CHARACTERISTICS OF EMITTERS ON RADIANT HEATING OF OPTICAL GLASS

Leningrad FIZIKA I KHIMIYA STEKLA in Russian No 6, Nov-Dec 85  
(manuscript received 7 Mar 84) pp 685-691

[Article by V. S. Doladugina, K. I. Kurilin, V. D. Cheltsova and  
I. P. Shakhmatova, State Optical Institute imeni S. I. Vavilov, Leningrad]

[Abstract] Experimental studies were complemented by theoretical consideration in an analysis of the dynamics of radiant heating of LK-7 optical glass in relation to the temperature and selective characteristics of the emitter. With a tungsten filament lamp fed with a 100, 140 or 180 V current resulting in filament temperatures of 1850, 2100 and 2280 K, respectively, resulting in filament temperatures of 1850, 2100 and 2280 K, respectively, radiant heating took place until the temperature of the glass plate became uniform and equaled the temperature of the emitting filament. Narrow-band high-temperature emitters resulted in more rapid and efficient heating of the optical glass with less temperature drop than seen with wide-band

low-temperature emitters. Maximal rate of heating was obtained with an absolutely black emitter and optical glass two centimeters thick or less. Figures 4; references 10 (Russian).

12172/9835  
CSO: 1841/370

UDC 541.147

BCl<sub>3</sub> SENSITIZATION OF CO<sub>2</sub> LASER-INDUCED REACTION OF HYDROGEN WITH CHLORINE

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: SERIYA 2. KHIMIYA in Russian  
Vol 26, No 6, Nov-Dec 85 (manuscript received 21 Sep 84) pp 613-614

[Article by A. P. Nikonorov and Ye. N. Moskvitina, Chair of Physical Chemistry, Moscow State University]

[Abstract] Reaction of hydrogen with chlorine in molybdenum glass cuvettes with barium fluoride windows required CO<sub>2</sub> laser pulses of at least 150 J/cm<sup>2</sup> when the reactants were present in a 1:1 mixture at 60-80 mmHg pressure. Addition of small quantities of BC<sub>l</sub><sub>3</sub> (1-3 mmHg), which effectively absorbs CO<sub>2</sub> laser emission, promoted the reaction of hydrogen with chlorine with a threshold energy density of ca. 20 J/cm<sup>2</sup>. The latter was equivalent to the energy required for multiphoton dissociation of BC<sub>l</sub><sub>3</sub>. The sole product of the reaction was HCl, while BC<sub>l</sub><sub>3</sub> remained unchanged. The reaction was apparently initiated by chlorine atoms formed by the dissociation of BC<sub>l</sub><sub>3</sub>. References 11: 1 Czech, 3 Russian, 7 Western.

12172/9835  
CSO: 1841/353

UDC 541.125

FORMATION OF OSCILLATION-STIMULATED CO<sub>2</sub> AND HCOOH MOLECULES IN REACTION OF FLUORINE WITH FORMIC ACID

Moscow KHIMICHESKAYA FIZIKA in Russian Vol 4, No 12, Dec 85  
(manuscript received 15 Nov 84) pp 1641-1647

[Article by V. G. Fedotov, Institute of Chemical Physics, USSR Academy of Sciences, Moscow]

[Abstract] In seeking a source of CO<sub>2</sub>(00°1) molecules, the authors studied the reaction of fluorine with formic acid and sought to assess the formation of such molecules or other oscillation-stimulated molecules. The possibilities of preparing a stable mixture of these substances and determination of the rate of the limiting stage of the radical-chain process were also investigated. Infrared spectra were obtained using the flames from mixtures of fluorine with

gaseous formic acid and carbon disulfide. Results showed that with the addition of CS<sub>2</sub>, formic acid rapidly burned off leaving CO<sub>2</sub> and HF compounds. Data on spectra of the flame formed in a flow-through reactor indicated that the smaller the diameter of the reactor, the greater the fluorine concentration needed to maintain the flame. Added amounts of CO<sub>2</sub> had little effect on the spectra produced by CO<sub>2</sub>(00°1). The yield of oscillation-stimulated HCOOH molecules per reaction molecules was proportional to the original concentration of HCOOH. The author concluded that the reaction of fluorine with formic acid was an effective source of the desired CO<sub>2</sub>(00°1) molecules, and under suitable conditions, also of HCOOH(v<sub>C=O</sub>). At 200-300°C and fluorine pressure of 2-3 Torr, reaction time was ca. 1 ms, and mixtures of fluorine and formic acid were stable for 10-20 minutes at room temperatures with 10-40 Torr pressure. Thus, all conditions for laser generation in F<sub>2</sub> + HCOOH are present. Figures 3; references 7: 2 Russian, 5 Western.

12131/9835  
CSO: 1841/347

RUBBER AND ELASTOMERS

UDC 541.182

EFFECTS OF CHEMICAL CHARACTERISTICS OF SOLID PHASE SURFACE ON STRUCTURE-  
FORMATION KINETICS OF REINFORCED BUTYL RUBBER

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 51, No 12, Dec 85  
(manuscript received 18 May 84) pp 1306-1310

[Article by N. N. Kruglitskiy and A. D. Kuznetsov (both deceased),  
Institute of Colloid Chemistry and Water Chemistry, Ukrainian SSR Academy  
of Sciences, Kiev]

[Abstract] Studies were conducted on the effects of the surface characteristics of filling agents on structure formation kinetics of butyl rubber; using a variety of analytical methods. In vulcanization, in a system with solvent, enhancement was seen with acetylene carbon black > cement > kaolin > chalk, whereas without solvent the ranking was carbon black > kaolin > chalk > cement. The combination of physical, chemical and spectroscopic data indicated that vulcanization proceeds in four stages. The first stage consists of coagulation-type structure formation as a result of orientation and interaction of polymer and filler molecules, followed by a second stage of enhanced structure formation, increased surface activity and chemical interactions between the system undergoing vulcanization and the solid phase. The third stage involves reaction of the butyl rubber with the vulcanization system and the filler, followed by the final stage of increased rigidity and strength, as indicated by the weakening of ESR signals and decrease in the intensity of IR spectra. The addition of fillers with different particle-size distribution patterns and chemical surfaces can be used to control the characteristics of the resultant elastomer.

Figures 4; references 13 (Russian).

12172/9835  
CSO: 1841/352

WATER TREATMENT

FINNISH PURIFICATION PLANTS FOR USSR

Helsinki DOMESTIC SERVICE in Finnish 1300 GMT 4 Feb 86

[Text] The Helsinki company (?Risto) Osakeyhtio is to supply 18 waste-water purification plants to the Soviet Union. The deal, worth FM 30 million, has been signed in Moscow. The sewage treatment plants will be supplied to the Kuybyshev area in Tyumen, Siberia, where they will operate in service villages for the oil pipelines to be built in the area. The plants will be built entirely in Finland, ready to use. The deal is part of a large supply arrangement from Finland, of which water treatment forms a separate project.

/9835  
CSO: 1841/381

WOOD CHEMISTRY

DEVELOPING WASTELESS TECHNOLOGY IN WOOD INDUSTRY

Moscow SELSKAYA ZHIZN (TASS) in Russian 3 Dec 85 p 1

[Text] The mechanized complex for the biochemical treatment of wood wastes now operating in Sosnovo (Leningradskaya Oblast) is a large chemical laboratory which can be described as an Industrial Association. It was put into operation at the Sosnovskiy Mechanized Forestry Administration (Leskhoz) by the State Commission. New technical lines are not intended for experiments--for the first time in Leningradskaya Oblast, a complex biochemical treatment plant for green wastes from tree-felling has opened.

Pine and spruce needles are separated from the branches by crushers. They continue through autoclaves, extractors, and distillation apparatuses and are turned into essential oils, balsam and carotene paste, coniferous wax, and other components of medicinal preparations and perfume products. Steam chambers also extract 100 tons of valuable wood vitamins--effective growth and productivity stimulators in meat and dairy animals.

The biochemical plant, staffed by Leningrad scientists and machinists, completed the construction of the Sosnovskoye Wood Treatment Industry, the largest in North-West RSFSR. Here nothing is lost. All wood which the leskhoz machine operators prepare by the "rubok ukhoda" [chop treatment?] method (named for the large forest) proceeds from the timber carrier to a continuous sorting conveyor where it is turned into the most diverse construction and everyday materials. Even the sawdust goes into production.

Approximately one million cubic meters of wood resources are processed every year at the Sosnovskiy complex, one of 20 industries in the Leningrad Forestry Association. The technical modernization of processing plants allowed the firm to increase its assortment of products to 150 items.

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CSO: 1841/405-P

## CELLULOSE WILL BECOME STRONGER

Moscow LESNAYA PROMYSHLENNOST in Russian 5 Dec 85 p 3

[Article by A. Kolotilin, deputy chief of the V. Production Association "Soyuzbumaga"]

[Text] The V. Production Association "Soyuzbumaga" reviewed the correspondence in which it was correctly noted that in the competition of industrial collectives which produce newspaper, it is imperative that we apply ourselves to the further intensification of work in decreasing the mass volume of paper and the cost of cellulose fibers.

Work directed to improving the strength properties of semifinished paper industry products is important for attaining this goal. For this, measures are currently being taken to increase the strength of cooking acids in the technical flow of cellulose production and also to improve bulk paper production.

In this work, positive results have already been achieved at the Balakhninskiy mill. There the shredding length of cellulose is in the range of 9.450 meters (the norm is not less than 9.000 meters), and of wood bulk, 3.237 meters (the norm is 3.200 meters).

However, the industries have reserves for further improving the effectiveness of production which are a long way from being fully implemented. In the course of further competition of the industrial collectives that produce newspaper, they will focus on new, more progressive figures in newspaper output per ton of paper and per amount of cellulose used in newspaper composition.

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SOCIALIST COMMITMENT OF SVETOGORSKIY PULP-AND-PAPER MILL COLLECTIVE TO  
12TH FIVE-YEAR PLAN

Moscow LESNAYA PROMYSHLENNOST in Russian 28 Dec 85 p 1

[Article: "Socialist Commitment of the Svetogorsky Pulp-and-Paper Mill Collective to the 12th Five-Year Plan"; last paragraph in boldface]

[Text] Production workers, engineering and technical personnel, and office workers of the Svetogorskiy pulp-and-paper mill in the 11th Five-Year Plan put acetate and fermentation production capacities into operation eight months earlier than the norm periods. Work on the construction of the third phase of the mill has been implemented also.

Simultaneously, 105,500 square meters of housing, preschool institutions for 640 children, a hospital with a polyclinic, and a trade center with an area of 1,182 square meters have been constructed and put into use for the improvement of living conditions of workers.

The collective has responded warmly to the decisions of the October, 1985 Plenum of the CPSU Central Committee. The materials of the conference of the CPSU on the acceleration of scientific and technical progress and further intensification production, and the documents of the 27th Party Congress brought about an unprecedented rise in labor activity of the Svetogorskiyans. After the control tasks for the 12th Five-Year Plan were worked out in detail in the shops, the mill workers supported the initiative of the AvtoVAZ Association collective and made commitments for the opening day of the party congress to manufacture, in addition to the two-month plan, 120 tons of commercial cellulose, 150 tons of paper, and 25 tons of nutrient yeast. In addition to the control figures of the 12th Five-Year Plan, 3,900 tons of commercial cellulose, 3,200 tons of paper, and 450 tons of nutrient yeast, worth 45 million rubles in all, will be produced.

The collective will expand production of consumer goods in the 12th Five-Year Plan. An output of 40,000 tons per year of bathroom-household paper based on the use of cellulose production by-products will be organized and put into the production of shops according to their conversion to finished output. Again, it is resolved to develop the capacities introduced in 1 year, or 6 months earlier than norm periods, and on this basis increase the production of consumer goods by a factor of 6.7. Because of the use of the product, it is resolved to organize the production of wood fiber slabs with a capacity of 1.5 million

square meters per year. Because of putting a Tamella regeneration system into operation in cooperation with the Paper Industry Production Association and the Paper Industry Research Institute, the enterprise will reach the project indicators for the consumption of chemicals. By increasing efficiency in the use of secondary resources, the Svetogorskiyans will save 7,800 tons of sodium sulfate per year in the production of sulfate sheet cellulose.

Because of the introduction of an automated control system of the mill power facilities, energy-conserving processes, and equipment of the collective, a savings of 12,800 tons of standard fuel, 35 million kilowatt hours of electrical energy, and 213,000 billion calories of heat energy is committed.

By continuing the development of the capacities of the third phase of the mill, the collective intends to provide project quality indicators of printing papers with a simultaneous lowering of the consumption of imported coniferous cellulose in the composition of papers by 10 percent, and this makes possible an economy for the years of the Five-Year Plan of 12,900 tons of critical semimanufactures.

By raising the quality of the production turned out, the Svetogorskiyans are committed to attain the award of the State Emblem of Quality for cellulose acetate, carboxymethyl cellulose, and writing and offset paper, and this makes it possible toward the end of the Five-Year Plan to attain the relative share of production of the highest quality category up to 50 percent of the total volume.

By accomplishing further technical re-equipment of the mill, we shall modernize the production of cellulose acetate, of the cable-insulating paper factory, and the yeast shop with an increase of capacities of 10,000, 14,800, and 2,000 tons, respectively.

A further improvement of working conditions, living conditions, and recreation of mill workers and members of their families will be provided. The construction of 30,000 square meters of housing, a kindergarten for 320 children, and a vocational-technical school for 320 students with a dormitory and dining hall, and a pioneer camp is planned--this is basis of recreation for 240-320 persons.

The Svetogorskiy pulp-and-paper collective assures the CPSU Central Committee that it will do everything necessary to fulfill the commitments assumed and will make their contribution to implementing the course of the party toward a further increase in production efficiency and on this basis a rise in the welfare of the Soviet people.

Socialist obligations are considered and accepted at the meeting of the mill collective.

12410  
CSO: 8144/0713

UDC: 628.543:541.18.945

ULTRAFILTRATION SEPARATION FROM SULFITE ALKALI OF LIGNOSULFONATES REMOVED  
FROM WATER BY COAGULATION

Leningrad ZHURNAL PRIKLADNOY KHMII in Russian Vol 58, No 10, Oct 85  
(manuscript received 26 Sep 84) pp 2286-2291

[Article by Yu. M. Medvedev, M. I. Medvedev and Ye. A. Tsapyuk, Institute  
of Colloid Chemistry and Water Chemistry imeni A. V. Dumanskiy, Ukrainian  
SSR Academy of Sciences]

[Abstract] The lignosulfonates contained in sulfite alkali are not biodegradable. The most economically suitable method of dealing with this problem is coagulation of lignosulfonates with polyvalent metal hydroxides or composite mixtures. The most promising method of obtaining high-molecular-weight, ecologically-safe, lignosulfonates is ultrafiltration, which achieves fractionation as well as preliminary concentration of the fractions retained by the membrane. The purpose of this work is to select an ultrafilter which retains the lignosulfonate fractions precipitated by coagulants and to study their concentration and effectiveness of removal from water by coagulants. Results obtained indicate increasing effectiveness of coagulation purification of lignosulfonates, decreasing content of a low-molecular-weight fraction in the alkali. An ultrafilter with pore diameter 50 nm is most effective in this process. The required 70-75% fractionation is achieved at a pressure of about 0.7 MPa. Thus, the ecologically safe fraction of lignosulfonates, that which can be practically completely removed by coagulants, can be obtained by ultrafiltration of technical alkali on UAM-500 membrane at 0.7 MPa. The degree of fractionation is almost independent of lignosulfonate concentration. Figures 4; references 14: 12 Russian, 2 Western.

6508/9835  
CSO: 1841/289

UDC 676.16:676.019

DIFFERENTIAL SCANNING CALORIMETRY IN ASSESSMENT OF WATER-CELLULOSE INTERACTION

Kiev UKRAINSKIY KHMICHESKIY ZHURNAL in Russian Vol 51, No 12, Dec 85  
(manuscript received 26 Jun 84) pp 1250-1254

[Article by N. N. Kruglitskiy (deceased), T. N. Polishchuk, V. P. Privalko  
and O. M. Vyazmitina, Institute of Colloid Chemistry and Water  
Chemistry, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] The interaction of primary cellulose material and cellulose products, eg., waste paper, with water was studied by means of scanning calorimetry over a temperature range of 173-473 K. The cellulose samples subjected to the differential scans had a moisture content of 8-65%, and were subjected to heating at a rate of 0.017-0.020 degrees/sec. The resultant  $\Delta H/\Delta T$  vs. T plots revealed identical thermograms for samples with 30-65% moisture, with two endothermic heat effects at low (ca. 273 K) and high (ca. 353 K) temperatures representing, respectively, structure breaking and evaporation of water. Samples with 8% moisture had only one peak at ca. 393 K; the absence of a low-temperature peak indicated that water did not crystallize in the samples. Analysis of the energies of activation of dehydration of the various cellulose samples demonstrated that dehydration consists of two stages, with the energies higher for primary cellulose than for cellulose subjected to aging or processing into products. In all cases the energies of activation for dehydration were twice as great.(88.4-109.3 kJ/mole) for samples with 8% moisture than for samples with 30-65% moisture. Figures 3; references 4 (Russian).

12172/9835  
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UDC: 547.458.81

CHANGE IN HYDROLYZABILITY OF CELLULOSE AS RESULT OF PLASTIC FLOW UNDER HIGH PRESSURE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 285, No 6, Dec 85  
(manuscript received 11 Feb 85) pp 1394-1397

[Article by Ya. M. Beluza, V. A. Zhorin, V. V. Ivanov, Ya. V. Epshtein,  
V. A. Bykov and N. S. Yenikolopyan, academician, All-Union Scientific Research Institute of Biosynthesis of Protein Substances, Moscow]

[Abstract] A study is presented of the properties of rigid-chain polymers after treatment under high pressure with shear deformation, using cellulose as an example. Changes undergone by natural cellulose as a result of plastic flow under pressure were studied on a Bridgman anvil apparatus at

2,000 MPa and room temperature using ash-3 wood cellulose. Specimens of cellulose filter paper containing various quantities of H<sub>2</sub>SO<sub>4</sub> were studied, saturated with various acid solutions and dried to constant mass. Five percent phosphoric and oxalic acids were also tested. The content of the easily hydrolyzable fraction was determined after the acid treatments. The phosphoric and oxalic acid have practically no influence on the easily hydrolyzable fraction in the initial specimens. However, after treatment under pressure, the yield of easily hydrolyzable fraction was significantly higher than in the acid-free specimen. The increase observed in the easily hydrolyzable fraction after treatment under high pressure and shear stress is explained by intensive destruction and formation of a large quantity of microscopic defects as in the case of metals following the same treatment. This significantly increases the surface of interaction of macromolecules with the reagent. Figures 2; references 11 (Russian).

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CSO: 1841/300

## MISCELLANEOUS

### OBSTACLES TO INTRODUCING AUTOMATED CONTROL

Moscow LESNAYA PROMYSHLENNOST in Russian 24 Dec 85 p 2

[Article by A. Shadrina, chief, Department of Computer Engineering, Metrology, Instrument Making and Automated Production Process Control Systems, USSR Ministry of Timber, Pulp and Paper, and Wood Processing Industry: "Reequipment of Paper Industry"]

[Text] Fundamental acceleration of scientific-technical progress is a basic issue of the party's economic strategy. A new technical reconstruction of the national economy must be effected, and on this basis the material-technical base of society must be transformed.

From the draft of the new edition  
of the CPSU Program.

"Our cardboard-making machine must be equipped with an automated control system. At the moment, workers can only judge visually whether or not the quality of a product is high."

G. Mokhov, brigade leader,  
cardboard-making machine operator,  
Kamensk Paper and Cardboard Factory,  
Kalinin Oblast

"A machine unit that our brigade services requires reconstruction. In particular, we would very much like to have a dependable automated production process control system. Can't our scientists create one which would not be inferior to the best world models?"

A. Teterin, senior mechanic,  
pulp-drying machine, Kotlass  
Pulp and Paper Combine,  
Arkhangelsk Oblast

"A machine of such a class as ours simply cannot be serviced without an automated production process control system!"

P. Zhulanov, senior mechanic,  
paper-making machine No 11,  
Solikamsk Pulp and Paper Combine,  
Perm Oblast

A demand for creating dependable Soviet automated production process control systems is contained in practically every letter devoted to scientific-technical progress. Considering the seriousness of the problem, we asked a specialist to comment on the mail concerned with this topic.

#### Obvious Pluses

Yes, the workers are right. The usefulness of automated production process control systems is indisputable. Today, in a time when production processes are growing increasingly faster and more complex, only introduction of automated control systems makes their optimization possible. Automation produces an impact in all three basic directions of modern production--that is:

It increases the productivity of each machine unit (machine, line),

it improves product quality,

it reduces losses of raw materials and energy.

The pluses of automated production process control systems have already been tested out in some production operations. As an example automated control of pulp cooking in periodic-action vats raised the productivity of the machine units by an average of 4 percent, significantly improved product quality, and reduced chemical consumption by 3 percent and steam consumption by 2 percent. Equipping paper and cardboard making machines, pulp bleaching lines and alkali regenerating lines produces an impact expressed in figures of the same order of magnitude.

#### Production Devoid of Automation

Workers are right when they say that automation is still but hovering at the threshold of the shops. Today, only one out of every five pulp cooking and bleaching installations is outfitted with an automated control system. Only two of 69 cardboard-making machines are being controlled by automatic systems. Only one paper-making machine out of every 25 possesses an automated control system.

What is keeping automated control systems from the shop?

#### No Control

Low responsibility of clients (that is, enterprise executives) for effective function of automated control systems is the most important factor significantly reducing the payoff of automated systems. This is precisely why the systems that have been introduced frequently fail to have a significant influence on the work of the combines, and why they sometimes even "die out" soon after their creation. Here is a typical example: Out of seven systems installed at the Kotlass Pulp and Paper Combine, creation and introduction

of which required expenditure of over 2 million rubles, five are not working at the fault of the combine's engineers. The deputy chief engineer of the enterprise was punished for the low effectiveness of the automated control system. And other executives of the combine, who managed the work of this specialist for 15 years, suffered no responsibility of any kind for the failure of introducing automated production process control systems.

Absence of an economic mechanism which would compel enterprise executives to reveal all reserves and to seek optimum variants of management is not promoting effective function of automated control systems.

#### Thirty Nannies

Introduction of automated control systems is being detained by the fact that in the sector, this area is the responsibility of not just seven but many more nannies: a total of 30 enterprises and organizations. Specialists of the Kiev TsKTBP [not further identified] are developing sensors for the systems. The control algorithms are being created by scientists of the Leningrad VNPObumprom [not further identified]. The Perm SPNU [not further identified] is writing the computer programs. The design work is being done in the Leningrad State Institute for the Planning of Pulp, Paper and Hydrolysis Industry Enterprises. And installation of the systems and their adjustment is the prerogative, once again, of the Perm SPNU.

The dispersal of the automated control system creators means that it takes an exorbitant time to develop the systems (some of them take 5-7 years to "crawl" from the laboratory to the shop), and that the systems contain numerous imperfections that must be corrected after they are placed into operation. But the chief problem lies in the "effect of the seven nannies": Not one of them is intelligently responsible for the work of automated systems that have already been placed into operation.

Moreover all of the developers are interested chiefly in signing the system introduction certificate. None of them are stimulated to care for their effective work a year or three after they are placed into operation. Another barrier blocking the path of the systems to the shops is that it is economically advantageous to scientists, programmers and adjusters to develop new systems rather than duplicating those which are already working successfully at the enterprises.

#### Electronic Scarcity

The third principal interference to introducing automated control systems is the shortage of such equipment. It takes an extremely long time for the sector to develop the necessary sensors for measuring production parameters. Scientists, designers and instrument makers of the TsKTBP are to blame for this. An extremely small number of minicomputers, microcomputers, connecting devices and displays are supplied to the sector. The computers are not protected against a caustic environment, meaning that they must be scaled or installed in special rooms. The needed acid-resistant Soviet-produced adjustment fittings are unavailable.

### The Program for Tomorrow

The sector is planning to place 81 automated production process control systems into operation in the 12th Five-Year Plan. In all in 1990, 175 automated production process control systems will be operating. This will insure automation of only 15 percent of the basic production processes.

### Unification, Training, Responsibility

What must we do to attain and try to surpass the planned level of automation? For me, a worker in the sphere of control, it would be more pertinent to talk about the transformations that must be made in the way the work is organized.

I think that we need to find a solution faster to the problem of creating a scientific-production association in the sector responsible for full automation. It would start doing all of the work associated with designing automated control systems: scientific, planning and design. It would assume the responsibility of producing the instruments and technical resources, laying out the automated control systems, and adjusting them. The association would become the sole manager of the systems, and it would be fully responsible for their creation and work. Let me note that such associations have existed for many years in most ministries.

We also need to reinforce the production base of special instrument making in the sector. We need to reequip instrument making industry and raise production to 30 million rubles by the end of the 13th Five-Year Plan (the present figure is 2.2 million rubles). We also need to significantly widen the assortment of sensors.

Plans are being made to seriously improve the computer competency of enterprise engineers. Lectures and practical lessons on automation, programming and computer technology will be included in the program of advanced training courses. Graduates of all institutions of higher education training personnel for the sector will get basic training on the problems of automated control systems. Good preparedness for work with computers will not only help enterprise specialists to adapt more easily to computers, but it will also help scientists to develop and introduce automated control systems.

Let me also express my wishes in relation to my own colleagues--workers of the ministry and the all-union production association: We need to increase the responsibility of enterprise executives for effective operation of automated control systems. Also, the workers must exercise more widely the rights granted to them by the Labor Collective Law. They must be more bold in demanding introduction and effective use of automated control systems from enterprise executives.

11004  
CSO: 8144/0709

HYDROGEN-POWERED MOTOR VEHICLE

Moscow ZNANIYE-SILA in Russian No 12, Dec 85 p 12

[Article by A. Fin, "The Hydrogen Car is Working"]

[Abstract] Hydrogen stored as methylhydrides is quite safe and suitable for use as a motor vehicle fuel. When hydrides are heated just a few degrees, the hydrogen previously absorbed is evolved and made available for a hydrogen-burning engine. A ZIL-130 truck has been equipped with such a hydrogen tank. The hydrogen is fed to the carburetor along with the gasoline line, decreasing gasoline consumption by 25% and decreasing harmful emissions by a factor of 10. Scientists are thinking today of making vehicles which burn nothing but hydrogen, eliminating gasoline entirely. Although such vehicles would be non-polluting, hydrogen is made by electrolytic separation of water, requiring electric power, which is generated to a great extent at power plants burning fossilefuels, thus simply shifting air pollution from the city to the location of the power plant. However, power plants can be adjusted for very efficient fuel burning, thus reducing total air pollution.

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